Impacts of COAL TRANSPORTATION in Southwest Florida

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Southwest Florida Regional Planning Council
2121 West First Street
Fort Myers, FL 33901

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I. Introduction

A. Purpose

The purpose of this study is to examine some of the impacts likely to result from the coal conversion of the Florida Power and Light Company electrical generating plant at Fort Myers. The project focuses on the transportation aspects of those impacts, with railroads and barges receiving particular attention. This project does not examine the feasibility of coal conversion itself. That issue will be dealt with through actions of federal and state governments and the generating company. A review of a recent feasibility study, however, is included as a part of the Appendix.

In 1979, about 2.2 million tons of coal were hauled by rail to Florida electric plants. That was 27% of the total 8.1 million tons used by those utilities. It is predicted that in 1985, 8.4 million tons (48% of the total) will be delivered by rail.(1) A draft feasibility study (April, 1983) concluded that the Fort Myers plant was a fair candidate for conversion.(2) As a result of coal conversion of that facility, Southwest Florida could be significantly affected by coal usage and the siting of facilities for storage, handling, and transportation of coal.

The U.S. Department of Energy has assumed that barges would be the coal transportation mode. Rail transportation, however, has been used elsewhere in Florida. It offers a reasonable alternative that deserves study. In this manner, the Southwest Florida Regional Planning Council, local governments, and other agencies can compare the various impacts of these and other transportation modes.

The results of this project can be used by the Southwest Florida Regional Planning Council itself, affected local governments, and the State of Florida. At all three levels - local, regional, and state - transportation planning is receiving greater attention. For this Regional Planning Council, the findings of this project would be utilized for review of projects coming before the Council. This Council is also developing a transportation element as part of a regional comprehensive plan. The results of this project will be utilized in development of that element.

For affected local governments, this document would provide a similar function. This study would alert those affected local governments to the need for planning for the possibility of rail, barge, or other means of transporting coal and the likely impacts associated with that possibility. Also, for all three levels of government in the Southwest Florida Region, the results of this proposed project could complement efforts to protect the Charlotte Harbor Resource Management Area.

B. Study Area

While the entire Southwest Florida Region is the study area for

this project, certain portions of the project will emphasize more limited areas. The study area for rail impacts generally consists of Lee County and Charlotte County. Specifically, it includes those portions of the two counties through which the Seaboard Coast Line Railroad passes. (See Figure 1. All figures are found in the Appendix.) This route would also include portions of Punta Gorda in Charlotte County and Fort Myers in Lee County. This particular route is utilized because it is assumed that if coal were to be hauled into the Region by rail, it would be shipped via Arcadia. Currently, that is the only route available that could serve the FPL plant in Fort Myers.

In the case of barge transportation, the study area is different. It would be the waterways and associated areas which barges currently use. This would include Port Boca Grande, the Intracoastal Waterway (through Pine Island Sound, San Carlos Bay and the Caloosahatchee River), and the terminal facilities at the FPL plant. (This assumes that there would be no changes from the currently used barge route.)

The focal point for the study area is the Florida Power and Light Company generating plant at Fort Myers.(3) The plant is located in Lee County, east of Fort Myers and on the south side of the Caloosahatchee River. (Section 35, Township 43 south, Range 25 east.) Total land area held by FPL at this facility is 460 acres with 356.5 acres of that in use. That facility has fourteen generating units.(4) (See Table 1. All tables are found in the Appendix.) The two main units (1 and 2) are used for normal operation. The twelve combustion turbine units are fired only to meet heavy demand, as during very cold weather. Only unit number 2 would be converted to burn coal if conversion occurred.(5)

References for Part I

(1) Florida Department of Transportation, Rail Element Resource Document , 1982, p. 5-1.

(2) U.S. Department of Energy, Economic Regulatory Administration, Office of Fuels Programs, Conversion of Florida Electric Powerplants from Oil to Coal Burning: Engineering, Environmental, and Economic Feasibility Study of 14 Florida Generating Stations , April 1983, p. 74. Hereafter cited as " Feasibility Study ."

(3) The reader should note that the FPL generating plant is not within the city limits of Fort Myers. It is, however, generally described as the Fort Myers plant.

(4) Florida Power & Light Company, Ten Year Power Plant Site Plan: 1983-1992 , 1 April, 1983, pp. 30-31.

(5) Feasibility Study , p. 18.

II. Southwest Florida

A. The Region

Southwest Florida covers an area of 6,663 square miles that consists of six counties. Four of the six counties border the Gulf of Mexico. The Region has a coastal orientation, with population and economic activity concentrated in the coastal urban areas. (See Figure 2.)

The northernmost county, Sarasota County, was established in 1921. The City of Sarasota is the county seat. The three other municipalities in Sarasota County are Longboat Key, North Port, and Venice. Longboat Key and North Port are relatively new communities, formed largely through the actions of development companies. Venice is one of the older cities in Southwest Florida. Englewood, an unincorporated area in the south coast section, is a growing population center that spills over into adjacent Charlotte County.

Charlotte County, also established in 1921, has seen most of its development around Punta Gorda, the county seat and only municipality. Charlotte County has extensive estuarine water resources. Charlotte Harbor dominates the western portion of the county, with the Peace River emptying into the harbor from the northeast, and the MyaKKa River from the northwest. Major growth has occurred in recent years in the unincorporated areas of Port Charlotte (north of Punta Gorda) and the Englewood/Grove City/ Manasota Key area on the coast. The City of Punta Gorda has experienced growth primarily in the west and south.

The county with the greatest number of the Region's growth centers is Lee County, established in 1887. Fort Myers, the county seat, and the two other incorporated municipalities in the county, Cape Coral and Sanibel, are growing rapidly due to immigration. There are also numerous distinct unincorporated areas with the potential to become major urban centers.

The southernmost county, Collier County, was established in 1923. It has the largest land area of any county in the Region. The area around the City of Naples has been the primary point of development. Collier County has the sole county seat in the Region that is located in an unincorporated area, East Naples. The former county seat, Everglades City, is the only other incorporated area. There is one inland population center of significant size, ImmoKalee, an agricultural community. Although unincorporated, it serves as a commercial center for northeastern Collier County.

Glades County, established in 1921, is the northernmost of the Region's two inland counties. The major population center is Moore Haven, the county seat. The remaining population is scattered throughout the County. Lake OKeechobee borders the eastern side of the County. The Caloosahatchee River flows from

the Lake through the southern part of the County toward the Gulf of Mexico. Glades County has experienced very gradual growth since its establishment.

The county with the second largest area in the Region is Hendry County. It has two population centers, the municipalities of LaBelle and Clewiston. LaBelle, the county seat, is in the northwestern part of the county and Clewiston is in the northeastern part, bordering Lake Okeechobee. The economy of Clewiston is primarily dependent upon the sugar cane industry, located in the area just south of Lake Okeechobee.

As can be seen in Table 2, only a little more than 12% (about 477,140 acres) of the Region can be classified within the broad category of "urban" land uses. If the category of "Open and Other" (urban lands cleared for development or in use for recreation) are deleted, less than 5% of the Region is urban. Most of these urban lands are located along the coast. As much as 95% of the Region's population, however, resides in coastal areas. Thus, while the amount of urban land in the Region (less than 5%) is small, the impact of urban development on the Region's coastal resources is significant.

Future development, however, will not be confined only to the coastal areas. As can be seen in Figure 3, significant growth is expected in the Region. While some of this growth will occur in inland areas, much of it will be an expansion of existing coastal communities and urban areas.

B. Transportation

Southwest Florida has a variety of water, rail, road, and air transportation facilities. (See Figure 4.) These are found primarily along the coast, in and connecting areas of heavy population and development.

1. Water

Water transportation facilities consist of a port (Port Boca Grande) and parts of two waterways (Intracoastal Waterway and Okeechobee Waterway).

a. Port Boca Grande

Port Boca Grande is the only deepwater port in Southwest Florida. The port lies almost at the southern tip of Gasparilla Island in Section 26, Township 43 south, Range 20 east of Lee County.(See Figure 2.) Gasparilla Island is a six and one-half mile long barrier island that separates Charlotte Harbor from the Gulf of Mexico. The northern quarter of the island lies in Charlotte County while the southern portion (which includes Port Boca Grande) is in Lee County. Road access is limited to Charlotte County via a privately-owned causeway and toll bridge.

There is no land connection with Lee County.

The port was a phosphate shipping center as early as 1887.(1) Phosphate was last shipped out in 1979 and rail service was ended the same year.(2) A representative listing of freight traffic is presented in Table 3.

The only port-related activity currently underway is the oil terminal operated by Belcher Oil Company. This ten- acre facility was built by Florida Power and Light Company in 1958 to receive fuel oil from tankers for transshipment by shallow draft barge to its generating plant east of Fort Myers.(3) The terminal at Port Boca Grande has four oil storage tanks (total capacity of 650,000 barrels) and an offshore docking facility. Oil tankers can be unloaded at the rate of 17,000 barrels per hour. Barges can be loaded at a maximum rate of 5,000 barrels per hour. Depth at the dock is maintained by dredging at about 32 feet. (Other sources list this depth as 38 feet below mean low water.) Vessels up to 650 feet long and 100 feet in width can be handled at the dock.(4) The 460-foot pier and the 260-foot dock are made of concrete.

A fairway (channel) provides safe passage from the Gulf to the facility. Approximately five miles long, thirty-two feet deep, and three hundred feet wide, the channel is maintained by the U.S. Army Corps of Engineers.(5) The initial dredging occurred in 1913 to permit deep-draft ore carriers to enter the Port to load phosphate ore. Since then, there have been thirty maintenance dredging operations. (That is once every 26.8 months over sixty-seven years.)

As of 1978, a total of $3,985,533 had been expended to maintain the fairway. The dredging has grown increasingly expensive. The initial effort in 1913 cost $27,972. In 1980, the cost of maintenance dredging was $741,503.(6) The amount appropriated by Congress for 1983 was $915,000. The amount requested by the Corps for 1984 is $1.1 million.(7)

All of these funds have been federal except in 1913. One-half ($13,986) of the 1913 work was paid for by local funds. Since then, however, all monies spent have been federal.(8) (For additional discussion of the expenditure of public and private funds relative to Port Boca Grande, the reader is referred to the review of the coal conversion feasibility study, an appendix to this report.)

Port Boca Grande is not a typical port. First, ships enter the port only to discharge cargo for transshipment by barge to the FPL Fort Myers plant. They do not take on any cargo for export to other cities, regions, states, or countries. (As noted above, phosphate was last shipped out of Port Boca Grande in 1979.) Second, the operation of the port benefits

only one company, Florida Power and Light Company. Third, only one commodity, fuel oil, is handled there.

There has been an on-going interest in Lee County to establish a port facility. At the same time, however, there have been growing misgivings about expansion of Port Boca Grande.

In 1983, the County Commission requested proposals for private industry to plan, finance, develop, and operate a port facility in Lee County. No location was specified in the request for proposal. It should be noted, however, that the request outlined significant constraints that would be placed on any proposal involving the use of Port Boca Grande.(9)

The request for proposal generated only one response, for an area in southern Cape Coral. That proposal was very vague and did not meet the standards established by the County Commission for the proposals.(10) Also, the City of Cape Coral strenuously objected to the proposal. The basic theme of its complaint was that the proposal was inconsistent with that area and the Cape Coral Comprehensive Plan.(11)

In April, 1983, the Southwest Florida Regional Planning Council published its Outer Continental Shelf Onshore Facilities Siting Study. In that study, a survey of all six counties in Southwest Florida revealed only three potential sites (all in Lee County) for onshore OCS facilities. After review, those sites were also discounted. Additionally, in a special action, the Regional Planning Council voted unanimously to recommend to interested agencies and other parties that Port Boca Grande (one of the three potential sites) not be considered as a site for onshore OCS facilities.

In September, 1983, the Lee County Commission rejected a long-standing proposal for the U.S. Army Corps of Engineers to study the potential of enlarging the Boca Grande channel for larger ships.(12)

The State supported the indefinite suspension of the study as a result of the action taken by Lee County. In a letter to the U.S. Army Corps of Engineers, Governor Bob Graham pointed out problems of strong local opposition, environmental sensitivity, limited land area, no rail or heavy-duty road access, and questionable need for the study. The Governor wrote, "The State would review its position on the resumption of the study only if these and other problems could be resolved."(13)

On February 29, 1984, the Lee County Commission abolished the Port Advisory Board. That group had supported the development of port facilities.(14)

In June, 1984, the Commission rezoned most of the land that had been zoned for port facilities on the southern tip of Gasparilla Island. Forty acres of land owned by CSX Corporation can now be used for residential development. (CSX Corporation is the conglomerate that includes Seaboard Coast Line Railroad.) As a result of that action, only the ten acres owned by FPL remain zoned for port activities.(15)

There is additional cause for opposition to port expansion by the State. Port Boca Grande lies within the boundaries of the Gasparilla Sound - Charlotte Harbor Aquatic Preserve. The management plan for the Preserve prohibits the construction of new port facilities and discourages expansion of existing ports.

Discussion of a port facility will probably continue. Based on actions such as those cited here, however, it appears that Port Boca Grande is currently not a likely candidate.

b. Waterways

There are two waterways in this Region. The Intracoastal Waterway follows the coast, generally between barrier islands and the mainland. It enters Southwest Florida from the north via Sarasota Bay in Sarasota County. The southern terminus of the Intracoastal Waterway is in Lee County in the eastern part of San Carlos Bay. At that point, where the Caloosahatchee River enters the Bay, the waterway becomes the Okeechobee Waterway. This then proceeds to Lake Okeechobee via the Caloosahatchee River. A list of all the bridges on these two waterways is provided in Table 4. The Intracoastal Waterway system does not reach any point in Collier County.

Much of the traffic on these waterways is recreational. This would include pleasure boats, sailboats, fishing craft (private), and related craft. Commercial and industrial traffic consists primarily of two types. Commercial fishermen form one group. Among these would be a variety of boats, some fishing and others traveling to and from a dock, supply point, fish house, or some other destination. The industrial portion of this traffic is composed mostly of the daily fuel oil barge shipment which supplies the electric generating plant at Fort Myers.

Table 5 is a compilation of commercial traffic statistics for federally maintained waterways in Southwest Florida. The locations are noted on Figure 5.

2. Air

Air transportation in Southwest Florida is oriented mainly around the two regional airports, the Southwest Florida Regional Airport (Lee County) and the Sarasota-Bradenton Airport. A number of smaller airports handle substantial commercial, charter, and

general aviation traffic. The Southwest Florida Regional Airport opened in May of 1983, replacing Page Field as the major airport for Lee County (and much of the Region). All commercial carriers now operate out of the Regional Airport, with Page Field open only to general aviation traffic (private aircraft, unscheduled flights, and small charters). This new airport is specifically designed to be able to accommodate the increasing air traffic into and out of Southwest Florida.

The opening of the Southwest Florida Regional Airport and other events introduce some new factors that do not permit a straight comparison with other years at other airports. Among these factors are deregulation of the airline industry, economic variations, and the attractiveness of the new facility. Generally speaking, however, passenger traffic into the Region has been increasing, while flight operations and cargo have not shown such increases. (Passenger counts, flight operations, and cargo statistics are provided in Table 6.)

For example, the total number of passengers passing through Page Field in 1980 was 5.61 times greater than in 1970. For the Sarasota-Bradenton Airport, passenger traffic increased 3.25 times. The number of landings and take-offs (flight operations), however, remained relatively stable at both airports. That is likely a result of the use of larger aircraft, with each craft generally capable of carrying more passengers. Air cargo totals increased more than the flight operations, but not as much as the passenger count.

3. Rail

Rail transportation service in Southwest Florida is provided by the Seaboard System Railroad, Inc. (formerly the Seaboard Coast Line Railroad). Freight service is furnished, but passenger service is not available. The primary products transported by the railroad include agricultural commodities. These agricultural products are grown in the interior part of the Region and are exported to other areas of the state. Among other items transported by rail are newsprint, construction materials, beer, propane gas, rock, and stumps.(16) The first four are imported into the Region while the last two are exported. The stumps are harvested here and shipped to other areas for processing.

Currently, the railroad enters Southwest Florida via three routes. The northernmost route passes from Manatee County into Sarasota County parallel to U.S. 301. From Palmetto, on the Manatee River in Manatee County, the railroad runs 18.7 miles to Sarasota. (A 5-mile spur at Sarasota is included in the 18.7 miles). Operating speeds range from a low of 10 miles per hour to a high of 40. The weight limit for this and all other railroad segments discussed below is 270,000 pounds, unless stated otherwise. From Sarasota to Venice is 18.2 miles. The operating speed is 25 mph. For both segments, service frequency is on an as-needed basis.(17) The Sarasota-Venice segment is

served by one train pulling 12 cars.(18)

A second route follows U.S. 17 from Arcadia in DeSoto County to Punta Gorda in Charlotte County. From there, it proceeds through Fort Myers to terminate east of U.S. 41 in Collier County south of the Lee-Collier line. The Arcadia-Fort Myers segment covers 51.6 miles. Operating speeds are 35 and 40 mph. The service frequency is three times per week.(19) Each train consists of one engine and about 25 cars.(20) For the Fort Myers-Vanderbilt Beach segment, the distance is 26.7 miles. Operating speeds are 25 and 35 mph.

The third route goes into Glades County with U.S. 27 from Sebring in Highlands County. From there, it extends on to Moore Haven and then to Clewiston in Hendry County. The distance from Sebring to Palmdale is 43.1 miles. The operating speed is 35 mph with a daily service frequency.(21) The track distance from Palmdale to Moore Haven is about 17.5 miles and about 14.5 more miles to Clewiston. The Seaboard Coast Line continues on into Palm Beach County, with about 5 miles of track from Clewiston to the county line.(22) From Palmdale to Clewiston, there are two trains, one in each direction, each day for six days per week. The normal train has one engine and 50 cars.(23)

Over the years, rail service to Southwest Florida has decreased. (The reader is referred to "A Long Range Perspective" in the Appendix. It is a discussion of declining rail service in Southwest Florida.) There have been three fairly recent abandonments. The rail line that formerly served Port Boca Grande has been completely removed as far north as Arcadia. The line that used to enter Naples now goes only to Vanderbilt Beach near the Lee County-Collier County border.

The most recent abandonment was in Glades and Hendry Counties. South of Palmdale, near the junction of S.R. 29 and U.S. 27, the railroad splits. The easternmost line goes on to Moore Haven and Clewiston as described above. The other line runs south for 36.3 miles to Immokalee. The abandonment of this line to Immokalee was recently authorized by the Interstate Commerce Commission, effective January 2, 1984. (At one time, this line extended to Everglades City.)

4. Roads

In terms of passengers, vehicles, and freight, the most heavily used transportation mode in Southwest Florida is the road system. In addition to private motor vehicle traffic, the road network carries commercial traffic which distributes the vast majority of goods consumed in the Region. Other uses include mass transit, inter-city bus traffic, service vehicles, and bicycles.

The local road system is badly congested. This is worsened during the winter months when the tourist and seasonal population is at its peak. Inter-city traffic has received some relief now that Interstate Highway 75 has been substantially completed

through the Region.

References for Part II

(1) Lee County, Florida, Port Boca Grande: A Basic Study , June, 1980, p. 2.

(2) Ibid., p. 8.

(3) Ibid., p. 10.

(4) Ibid., p. 12.

(5) Ibid., p. 10.

(6) Girlamo DiChiara, Department of the Army, Jacksonville District, Corps of Engineers, to staff, Southwest Florida Regional Planning Council, 26 October, 1983.

(7) Rosalyn Averill, "$1.5 Million Sought for Dredging in Lee," Fort Myers (Florida) News-Press , 2 February 1984, sec. A, p. 14A.

(8) Gail G. Gren, Department of the Army, Jacksonville District, Corps of Engineers, to staff, Southwest Florida Regional Planning Council, 13 December, 1983.

(9) Lee County (Florida) Port Authority, "Request for Proposal To Plan, Finance, Develop and Operate a Port Facility in Lee County, Florida," 1983, pp. 13-15.

(10) Jane Musgrave, "Commission Ships Port Proposal Out to Sea," Fort Myers (Florida) News-Press , 21 September, 1983, pp. 1B and 2B.

(11) Robert D. Proctor, City Manager, Cape Coral, Florida, to Roland H. Eastwood, Chairman, Lee County Port Authority, 13 September, 1983.

(12) Jane Musgrave, "Lee Sinks Boca Grande Port Study by Not Voting on Government Offer," Fort Myers (Florida) News-Press , 21 September, 1983.

(13) Bob Graham, Governor, State of Florida, to Colonel Alfred B. Devereaux, Jr., U.S. Army Corps of Engineers, 23 March, 1984.

(14) Susan Ornstein, "Lee Sinks Port Advisory Board, " Fort Myers (Florida) News-Press , 1 March, 1984.

(15) Tom Butler, "Port Decision Gives Supporters Sinking Feeling, " Fort Myers (Florida) News-Press, 18 June, 1984, pp. 1B and 2B.

(16) Jack Cherry, Jr., Superintendent, Seaboard System Railroad, to staff, Southwest Florida Regional Planning Council, 16 May, 1984.

(17) Florida Department of Transportation, Rail Element Resource Document , 1982, pp. A-64 and A-65.

(18) Jack Cherry, Jr.

(19) Florida Department of Transportation, pp. A-51 and A-52.

(20) Jack Cherry, Jr.

(21) Florida Department of Transportation, p. A-54.

(22) SWFRPC staff estimates.

(23) Jack Cherry, Jr.

III. Coal Usage

A. Electricity Generation

In order to examine the impacts that might occur if coal were brought into this Region, it is necessary to estimate the expected electrical generation needs and the quantity of fuel required to meet those needs. These can then be used to estimate the transportation requirements to import that coal into Southwest Florida. Those requirements could be in terms such as number of trucks, unit trains, barges, or pipeline capacity.

Florida Power and Light Company operates the only electrical generation plant in Southwest Florida. For its entire (statewide) service area, the total sales of FPL in 1990 are estimated to be approximately 32.3% greater than those of 1982.(1) (That service area includes 2,402,998 customers in thirty-five counties and twelve generating plants in southern Florida, the eastern coast, and the northeastern corner.)(2) This increase may even be understated for Southwest Florida because this Region has experienced greater growth rates than other areas. If it is assumed that fuel consumption will increase in the same manner as total sales, then fuel consumption could increase about 32% by 1990. As noted above, this is likely to be a conservative estimate. The actual increase may be higher.

It is difficult to correlate electrical sales directly to county or regional boundaries. The service areas of electrical utilities generally do not conform to those boundaries. An additional complexity involves the sharing that occurs within a utility system (among its own generating plants) and between utilities. For example, FPL has purchased excess electricity generated by other utilities such as Tampa Electric Company. This means that it is possible for FPL to sell more power than it generates.

Another factor must be added to this already complicated task. The simplest way to estimate fuel usage would be to project current oil usage to some future date (once a projection method had been selected). That projected oil quantity could then be converted to an equivalent amount of coal. In order to apply this method to a specific generating plant, it must be assumed that conversion of that specific plant will occur and that the plant will be operating at the same generating capacity with coal as with oil.

It is possible, of course, that conversion of a current oil-burning facility may not occur. It is also possible that, even if converted, the plant may operate at a lower capacity. This latter possibility could occur if the converted plant were less efficient burning coal than oil. It also could be possible that some portion of the projected load of the plant (converted or not) could be assumed by some other, more efficient plant.

B. Oil

In 1965, oil was used to produce 56.2% of the electricity generated by Florida utilities. (See Table 7.) By 1980, that figure had slipped to 46.2%. Compared with the rest of the United States, however, Florida utilities still rely heavily on oil. Three Florida utilities were among the top twenty of one hundred and eighty-five utilities in oil receipts in 1980 in the United States. The first--of all one hundred and eighty-five--was Florida Power and Light Company. Florida Power Corporation was fifth and Jacksonville Electric Authority was twentieth.(3)

The Fort Myers FPL plant burns oil exclusively. Fuel usage by both units of the Fort Myers plant in 1978 was about 3,650,000 barrels of heavy oil.(4) (This does not include the twelve combustion turbine generators used for unusual peak demands.)

Actual fuel usage in 1982 increased to 4,536,111 barrels for both units. This represented an increase of over 24%. Unit 2 burned 3,070,003 barrels of the total amount of heavy oil.(5)

If the same fuel were used, the same circumstances of fuel transport were to apply, and no new generating capacity were needed, there may be relatively little change in the number of fuel deliveries per year. For example, it may be possible to increase the amount of fuel oil carried on barges as much as 10 or 15 percent. More than that, however, may result in the need for more deliveries, more barges per delivery, or barges of larger capacity. Whereas one delivery per day was sufficient in 1979, one and one-half deliveries may be needed by 1993. That may occur as three deliveries every two days, changes in delivery times, using more barges, switching to larger capacity barges, or some other arrangement.

C. Coal

As noted above, fuel usage for electrical generation in Florida has slowly been shifting away from petroleum. (See Table 7.) Coal usage, however, has increased. For example, in 1965, coal fueled 17.8% of electrical generation. By 1981, that share had increased to 21.9%.

Coal usage for electrical generation in the entire United States has demonstrated a similar pattern. (See Table 8.)

Estimated coal use for electrical generation was 10,930,000 tons in Florida in 1982.(6) By 1990, that usage will increase by about 131%. (See Table 9.) That quantity (25,278,000 tons) will be burned by existing and planned facilities. If all potential coal conversions are made, as much as 35,850,000 tons of coal could be burned in 1990 in Florida.(7) That will be an increase of 228% over the 1982 amount.

D. Fuel Changes

Use of a different fuel could have significant impact on the operation of Fort Myers unit number 2. A recent study of coal conversion projects a reduced role for unit number 2. For example, 1990 coal demand is expected to be 410,000 tons at an average plant capacity factor of 0.32.(8) In 1982, unit number 2 burned 3,070,033 barrels (128,940,126 gallons) of heavy oil.(9) That is equivalent to about 798,200 tons of coal.

The projected reduction in fuel demand is based on an expected decrease in the use of the unit if coal conversion occurs on a broad scale. Larger capacity generating units usually have lower heat rates. That is, they use less fuel to produce a unit of electricity. Thus, it is assumed that larger units will operate at a higher usage rate than smaller (less efficient) units.(10) The average plant capacity factor for unit number 2 is 0.56 without conversion and 0.32 with conversion.

The barges currently used by FPL carry a maximum of about 11,000 barrels of oil.(11) Those 11,000 barrels (462,000 gallons) weigh about 1,650 tons. The Fort Myers plant would require about 410,000 tons of coal in 1990 if converted. If it were assumed that each barge could carry an equivalent weight of coal, about 250 barges of coal would be needed to meet that demand. (It is unlikely that an oil barge could be used to transport coal due to the different physical characteristics of the two fuels. The assumption is made, however, to provide some indication of the number of craft that might be needed.) (See Table 10.)

A barge of similar dimensions probably would carry much less coal. At the more realistic capacity of 1,000 tons, about 410 barges of coal would be needed in 1990. Even that may be a low figure since the current water route cannot accommodate a barge with a draft of nine feet.

References for Part III

(1) Florida Power & Light Company, Ten Year Power Plant Site Plan: 1983-1992 , Miami, Florida, 1 April, 1983, p. 50.

(2) Ibid., p. 25.

(3) U.S. Department of Energy, The Florida Statewide Coal Conversion Study: Coal Supply and Transportation Analysis , September, 1983, p. 2-1. (Hereafter cited as "U.S. Department of Energy, Coal Supply .")

(4) Southwest Florida Regional Planning Council, Regional Energy Plan , Fort Myers, Florida, 19 April, 1979, p. 28.

(5) Frank Balogh, Power Services Analyst, Florida Power & Light Company, to staff, Southwest Florida Regional Planning Council, 7 November, 1983.

(6) U.S. Department of Energy, Coal Supply , p. 3-3.

(7) Ibid., p. 3-7.

(8) Ibid.

(9) Frank Balogh.

(10) U.S. Department of Energy, The Florida Statewide Coal Conversion Study: Alternatives to Coal Conversion for Florida Utilities , October, 1983, p. 24.

(11) Frank Balogh.

IV. Transport Alternatives

This report addresses several alternative transport modes for coal movement into Southwest Florida. They are not presented in any order of priority, although some are more likely to occur than others. None, however, are without problems. Each alternative is reviewed and any relevant existing use or example is discussed. The potential positive and negative impacts are examined. Additionally, in discussing each alternative, an attempt is made to determine how feasible that alternative is.

Most of the alternatives that are addressed are individual modes. It quickly becomes apparent, however, that coal transport could easily involve a combination of these modes. Therefore, possible combinations are also discussed.

A. Barge

Florida Power and Light Company currently receives fuel oil at its Fort Myers plant by barge. That fuel is first delivered to Port Boca Grande by tanker from Texas, Louisiana, or other sources. At Port Boca Grande, it is off-loaded, stored, and then loaded onto barges for transshipment to Fort Myers.

Each barge has a capacity of 11,000 barrels and measures 210 feet long, 45 feet wide, and 10 feet deep. (These are exterior dimensions.) About 95% of the shipments consist of two barges in tandem pushed by a tugboat while the remainder have one barge. In 1982, FPL received 4,610,964 barrels of Bunker C oil (420 barges) in this manner.

The trip from Boca Grande to the Fort Myers plant requires seven to eight hours. Two persons assist in loading the barges, two persons man the tug and barges, and one person offloads at Fort Myers for a total of five people.(1)

An ocean-going barge could carry from 19,000 to 32,000 tons of coal and draw twenty-five to thirty-two feet of water. A barge commonly used for river traffic has a capacity of about 1,500 tons. (This refers to larger, deeper rivers such as the Mississippi--not the Caloosahatchee River.) It measures 195 feet long and 35 feet wide with a draft of 9 feet. A river barge such as this cost about $225,000 in 1978.(2) There is also a 1,000-ton river barge that measures 175 feet by 26 feet with a draft of 9 feet.

The barges currently in use for fuel delivery to the FPL plant can operate safely in the relatively shallow water encountered from Boca Grande to the Fort Myers plant. To utilize either of the two river barges noted above, however, would require water depths of twelve to fifteen feet.

This is a result of the additional depth needed for operation of the barges. For slow speed operation and maneuvering, as at

dockside, there should be a channel depth of at least three feet more than the draft of the craft at dockside. For operation at higher speeds to achieve greater efficiency and economy, channel depth should be five feet more than the draft of the vessel.(3) The authorized project depths for the current barge route are nine feet from Boca Grande to San Carlos Bay, ten feet from Punta Rassa to Fort Myers, and eight feet above Fort Myers. These depths are too shallow for safe operation by either of the two river-going barges.

It should be noted that actual depths are less than authorized depths in several areas. The U.S. Army Corps of Engineers performed a survey of area waterways in June of 1980. In the Pine Island Sound portion of the Intracoastal Waterway, several areas were recorded to have depths of seven and eight feet (rather than nine). In the Caloosahatchee River below Fort Myers, depths of eight and nine feet were fairly common (rather than ten feet). Additional shoaling may have occurred since the date of the survey.

There are two alternatives or routes utilizing barges. They are the following:

1. existing route, i.e., from Port Boca Grande to the FPL plant, and
2. from Tampa to the FPL plant.

Other alternatives involving direct, non-stop shipment by barge from a New Orleans port or similar source are not considered feasible. This is due to problems encountered in the use of a barge capable both of crossing the open Gulf and going up the Caloosahatchee River with its relatively shallow depths.

Coal could be delivered to Port Boca Grande or Tampa via ocean-going barge or ship from a New Orleans area port or some other source. Railroad transportation could also be used to supply coal to Tampa for transshipment by barge to Fort Myers.

A factor contributing to the continued use of barges for fuel shipment (oil or coal) is the avoidance of costs associated with a different route or means of transport. Even if more barges or barge-trips are required, the same route can be used. The user (in this case, FPL) pays only to load, ship, and unload the fuel. Construction and maintenance of the waterway and its associated structures are not the responsibility of the user. The U.S. Army Corps of Engineers does that at taxpayer expense. That, of course, reduces the cost of shipping for the utility. Additionally, there are no user fees or charges to recoup these federal expenditures.(4)

A problem with the use of barges on the same route is that the coal must be handled several times. It would have to be loaded onto an ocean-going barge for the trip from Louisiana to Tampa. There, it would be unloaded for storage and/or further distribution. Coal being shipped to Fort Myers would be loaded

onto smaller barges for the trip to the generating plant. That handling would occur whether the ocean-going barge landed at Tampa or Port Boca Grande. If a landing at Tampa were combined with a second stop at Port Boca Grande, that would add another handling. At each handling or transferral point, personnel, equipment, and space for operations will be required. Essentially, each handling point will mean a duplication of facilities with the additional cost.

It would appear that the use of Port Boca Grande as a point of transferral from ocean barges to river barges could be justified economically more easily than its use as a stop after docking of the ocean barges in Tampa. In the latter case, it would be an unnecessary cost.

B. Rail

For coal movement, the unit train is the most efficient form of rail transportation. A unit train is one that transports a single commodity. All of the cars in the train would be loaded with coal, usually at a single origin, for travel to a single destination.(5)

Unit train operation is different from that of the regular freight train in several other ways. First, the train operates as a unit. That is, the locomotives and the cars remain connected. The locomotives do not pick up or drop cars at various points along the route. Second, the unit train may travel more than 800 miles per day as compared to less than 100 miles per day for general freight trains.(6)

For efficient operation, the unit train would be in constant use, loading, transporting, or unloading coal. Downtime, as for maintenance, should be minimal. Ideally, coal would be loaded at the mine and unloaded at the electrical generating plant (or other point of use). This direct, mine-to-user type of delivery eliminates multiple handling of the coal.

The typical unit train car is either an open-top gondola or hopper car.(7) The cars would likely be 100-ton hopper cars pulled by six locomotives. A variety of car sizes are available.(8) (See Table 11.)

It is also possible that smaller unit trains could be used. As few as thirty cars might make up a unit train, depending upon the circumstances and the alternatives available for coal transport.(9)

Once the unit train arrives at its destination, the coal must be unloaded quickly for efficient operation. Gondola cars can be tipped to empty the coal while the bottom is opened on hopper cars to dump coal into a pit or similar containment area. Some typical unloading systems are presented in Table 12.

A fully loaded car with 100-ton capacity may weigh more than 130 tons.(10) This weight can result in significant wear and tear on

facilities when compared to general freight cars. Unit train speeds in Florida have been estimated at twenty to fifty miles per hour.(11)

Another incentive for efficient operation is equipment cost. A unit train coal car with a capacity of 100 tons cost about $40,000 in 1978 while a locomotive (3,600 horsepower) cost $800,000 then.(12) Costs should be even higher today. A unit train of one hundred cars pulled by six locomotives could cost approximately $9 million at those prices.

There are two rail alternatives for coal transportation. They are the following:

1. direct shipment from coal-producing areas to Fort Myers, and
2. shipment from Tampa to Fort Myers.

The first rail alternative seems less likely than the second. Direct shipment, using unit trains, would be feasible only if there were a large user in Fort Myers. Currently, there is no large demand for coal nor is there likely to be in the near future (with the possible exception of the FPL plant). This Region does not have large manufacturing plants that would burn large quantities of coal. Additionally, even if converted to burn coal, the Fort Myers plant alone may not use enough coal to justify the unit train type of coal delivery.

If the unit train were to deliver coal to several users, the feasibility of direct shipment could be increased. The efficiency of the unit train, however, lies in its nonstop operation. Thus, the additional coal demand that could be met by serving more than one user (or several users at one destination) would have to be balanced against the costs of this different operation.

Some consideration would also have to be given to those cars that would be emptied at the first or second stop. A problem in any unit train operation is that the cars are empty on the return trip. (The same can be said for barge transport and much of the truck transport in this Region.) That produces costs but no benefits. This problem would be aggravated if there were multiple stops because some of the cars would travel empty over more than one-half of the distance.

As noted above, unit train cars are very heavy. For example, a fully loaded car with 100 tons of coal may weigh more than 130 tons altogether. Therefore, before a unit train operation could begin, a survey would have to be conducted of all tracks, bridges, and other facilities that would be traveled over by the unit train. More than likely, repairs and upgrading would be required. This would be expected in Southwest Florida, based on the decline in railroad traffic that has occurred. Heavily traveled lines generate more revenue than lightly traveled lines. This, combined with a greater need for maintenance to serve the

heavier traffic, would seem to ensure that such lines would be better maintained.

C. Pipeline

Pipelines normally carry liquid or gaseous products. For example, the crude oil produced in Hendry, Lee, and Collier Counties is transported across South Florida via pipeline. The Sunniland Pipeline runs a distance of 119.67 miles from Sunniland (in Hendry County) to Port Everglades (at Fort Lauderdale in Broward County). (See Figure 6.) This line is composed of 4, 6, and 8-inch steel pipe, with three pumping stations. It has a capacity of 15,000 barrels (630,000 gallons) per day. The current quantity being pumped through the line is about 9,000 barrels (378,000 gallons) per day.

The transmission line is fed by 34 miles of gathering lines from oil fields in Collier and Hendry Counties. The gathering lines can pump a total of 24,000 barrels (1,008,000 gallons) per day.(13) Oil from Lee County wells is delivered to Sunniland by tanker truck.(14)

Pipeline transport of coal utilizes water as the transport medium. For coal slurry, ground coal and water are mixed in about a 1:1 ratio (by weight). The slurry mixture that results can then be pumped through a pipeline. This 1:1 ratio would require dewatering because the water used for transport would interfere with efficient burning.(15)

Other coal-water slurries with different ratios have potential for alternative fuel. For example, one mixture is composed of 70 percent finely crushed coal, 29 percent water, and the remainder is additives. The slurry can be transported much the same as number 6 boiler fuel. For example, railroad tank cars and utility storage tanks could be used. The additives in the slurry would prevent coal particles from settling out of the mixture.

For transportation purposes, this slurry would be handled almost exactly the same as oil. Dewatering would not be necessary before burning. Additionally, air pollution could be reduced because coal washing performed during preparation of the slurry would remove most of the ash and some of the sulfur. For a generating unit designed for oil, however, some modifications would be required.(16)

A coal slurry pipeline will produce a large quantity of water at the point of use. (Residual water would not be a problem, of course, for coal-water mixes designed to be burned without dewatering.) For example, it has been estimated that delivery of four million tons of coal annually would result in 600-700 million gallons of water per year.(17) It may be possible to recover 60-70% of this water for reuse on-site (e.g., power plant condenser cooling) and agricultural irrigation.

Unfortunately, there exists a significant impediment to slurry

water reuse or discharge - poor water quality. High levels of total dissolved solids, heavy metals, sulfate, and biochemical oxygen demand require significant treatment (and expense) before the water can be reused or discharged into nearby water bodies.(18) This problem of poor water quality will be compounded if municipal or industrial wastewater is used to make up the initial slurry.

Oil can also be used as a transport medium with coal. A coal-oil slurry (50% pulverized coal and 50% number 6 fuel oil by weight) could be transported via pipeline. This type of mixture would require a source of oil whereas the coal-water slurry requires water. At the destination, dewatering would not be required. Additionally, the use of oil would likely mean that fewer boiler modifications would be needed. This would reduce expenses.(19)

The most efficient operation of a coal slurry pipeline would involve a pipeline originating at the coal mine and terminating at the electrical generating plant or other point of use.

A stumbling block to pipeline development is lack of eminent domain powers for pipeline companies.(20) Eminent domain is defined as the right (usually of a government) to take private property for public use. The owner whose property is being taken cannot refuse to relinquish that property. The government must, however, pay just compensation for the property being taken. Sometimes the parties involved cannot agree on the compensation. The government will then condemn the property and a court will settle the dispute as to compensation.(21)

The completion of a pipeline would require that numerous property owners permit pipeline passage through their properties. It has been estimated that this could be successfully negotiated in 98-99% of the cases. Condemnation might be necessary in only a small number of situations. Even if these optimistic estimates were to hold true, that small number of refusals could effectively stop a pipeline. The actual impact would depend on the circumstances.(22)

Under Florida law, eminent domain may be used to

> ...enter upon any lands, public or private, necessary to the business contemplated in the charter, and ... appropriate the same, or ... take from any land most other material which may be necesary for the construction and the keeping in repair of its works and improvements upon making due compensation according to law to private owners. (361.01, F.S.)

Eminent domain is granted to non-governmental entities to construct and/or operate the following:

dams for waterpower,
electric railway companies,
waterworks companies,

natural gas companies,
petroleum and petroleum products pipeline companies,
companies owning and operating sewer systems, and
coal pipeline companies.

Eminent domain powers are granted to coal pipeline companies "...to make available low-cost electric power to all residents of the state...". The right of eminent domain, however, is not granted without certain conditions. They are the following:

a. "the least property or interest therein" shall be taken,
b. the property or interest must revert to its original owner (or successors) if not used within a reasonable time after the taking,"
c. the original owner (or successors) must pay for the property or interest, and
d. in any condemnation proceedings, the court will be bound by the findings of the Florida Public Service Commission on issues of economic and environmental feasibility. (361.08, F.S.)

There are two other requirements that are considerably more difficult to satisfy. The act will take effect after these are met. First, eminent domain authority must have been granted to the coal slurry pipeline company(ies) by every state through which the pipeline will pass en route to Florida. Second, a continuous source of water must be available for use in the coal slurry pipeline. (Section 5, Chapter 79-236)

The major force opposing pipeline construction is the railroad industry. Maritime interests involved in shipping fuel oil likely would also lose some traffic. Railroads would especially feel the impact if a pipeline carried coal rather than they.

The type of opposition that could be expected against a serious effort to develop a coal slurry pipeline can be seen in the opposition that developed against the Transgulf Pipeline. That project, through conversion of an existing pipeline and construction of new sections, would run 889 miles from refineries in Baton Rouge, Louisiana to Port Everglades in Fort Lauderdale, Florida. The converted pipeline, currently carrying natural gas, would be used for oil. A second pipeline would be constructed beside it to carry natural gas.(23)

From the perspective of Southwest Florida, the pipeline alternatives are limited--either a pipeline will enter the Region or it will not. The impacts that might occur in areas outside this Region are beyond the scope of this study.

The feasibility of pipeline construction is dependent upon the existence of a large user, such as an electric generating plant or industry. This is not an industrial area. There is not now and is not likely to be the type of industry that would burn

large quantities of coal on a long-term basis.

There is, of course, an electrical generating plant, the FPL facility at Fort Myers. Based on recent projections, even if converted to burn coal, that plant may not be a large enough user to justify construction of a pipeline into Southwest Florida.

A pipeline could also be constructed to serve multiple users. There could be short branches off the main pipeline at a number of points. The advantage for pipeline development would be increased coal demand and greater revenues. The disadvantages would be increased costs, increased technical difficulties, and increased equipment and facility needs.

For example, in the case of a single user or single distribution point, only one set of receiving and dewatering facilities would be required. In the case of multiple distribution points, facilities for receiving, dewatering, and treatment would be required at each point. Additionally, the problems of disposal of the slurry water would have to be addressed at multiple sites, rather than one. This would increase the risk of negative impacts on water resources.

Another problem with multiple users is that the characteristics of the coal demand are likely to be different. It would be unlikely that, say, five users would all be satisfied with the same coal slurry mix.

While the technology for this type of coal transportation system does exists, it is a controversial matter. Construction of a pipeline that would reach as far south as Fort Myers would have to traverse most of the length of the state. It would be much longer than any other coal slurry pipeline currently operating. Additionally, the one current pipeline transporting coal is in Arizona, a state with environmental conditions very different from those in Florida.

D. Coal-by-Wire

Coal-by-wire involves the importation into one area of electricity produced by burning coal in an electrical generating plant in another area. In this alternative, high voltage transmission lines are the means of transport. Coal-by-wire can take two forms. An example of the simpler of the two would be the use of electricity in this Region that was generated at a coal plant in Tampa. Also, electricity generated in Georgia might be used here.

The second form of coal-by-wire may originate at the point of coal production in mine-mouth generation. An electrical generating plant located at a mine generates electricity using coal mined at that or nearby mines.

Coal-by-wire is a reversal of other coal transportation

alternatives. Coal-by-wire generates electricity at the point of coal production. Electricity is then transmitted to the point of demand. Other transportation alternatives transport the coal to the point of demand. Then, the coal is burned to produce electricity.

The major advantage of coal-by-wire generation is that most of the impacts associated with coal transportation and electricity generation occur outside the Region.

Impacts will still occur within the Region, of course. Transmission lines and supporting towers will have to be constructed and maintained. Rights-of-way will have to be cleared. These will be one hundred feet wide or more. Service roads to provide access for construction and maintenance will have to be built.

Impacts can be reduced if existing rights-of-way are utilized. This depends on the requirements of any proposed coal-by-wire transmission lines and the space available in the existing rights-of-way.

E. Truck

Large trucks and trailers could be used to transport coal to Southwest Florida. Truck transportation would utilize existing roads. It would not require the development of a new transportation network. In addition, the existence of a road network would permit a flexibility that other transportation alternatives could not match. Generally, truck transportation could be utilized at any time. Trains, by being tied to a track system, would not be able to move as freely or easily. Trucks, on the other hand, could operate much more freely.

Individual trucks, by not being part of a larger unit such as a train or barge tow, could also provide some advantages of quicker delivery. That would depend very much, however, on other conditions, the most important of which would be the distance involved.

Truck transportation is not without its disadvantages. First, trucks are limited in their capacities by the conditions of their operation. For example, it is possible to design, build, and operate a truck of gargantuan proportions. The physical dimensions of such a vehicle (its weight, height, width, and length), however, would limit its usefulness to non-public roads.

Second, even for a vehicle of more normal size, weight limits on roads and bridges could prevent use of its full capacity. Weight restrictions on interstate highways would limit total truck weight to 80,000 pounds. Thus, a truck and trailer unit with a capacity of 52,000 pounds (26 tons) and an equipment weight of about 20,000 pounds would be operating close to the maximum.(24) (A single unit train car could carry almost four times as much as such a truck.) Local roads would often have lower weight limits.

Even when weight limits on roads might not be a problem, those of bridges could be.

Third, truck operation may be subject to weather conditions. For short distance hauling in this Region, weather would generally not be a deterrent. For long-distance hauling in which trucks were used to transport coal from mines, the snow and ice of northern states could interfere with delivery schedules.

Fourth, strikes, work stoppages, and labor disputes could interfere with truck transportation. More personnel are required per unit of coal transported by truck than by other transportation methods. That greater number of personnel would make this form of transport more susceptible to labor disputes than other forms.

Fifth, truck transportation would likely be more costly for each unit of coal delivered. This would reflect the fact that more personnel and more equipment are required for each delivery than in other modes.(25)

Trucks could be used in two general ways. These would be the following:

1. direct shipment from coal mine to generating plant or
2. hauling from other sources of supply (such as a port) to the generating plant.

Truck transportation is not likely to be used to transport coal into Southwest Florida from other states. This would be due to the long distance between the source of coal and the use. Long-distance hauling would be adequately performed by other modes.

Trucks could be used, however, for short-distance, local hauling. For example, trucks could transport coal from Tampa, Port Boca Grande or the nearest rail connection. The disadvantages of truck transport would seem, however, to make even such short-distance hauling problematic. Additionally, roads in the area of the FPL plant are already subject to heavy traffic conditions. Those conditions are even worse during the winter tourist season. At any rate, significant opposition to the use of heavy trucks for routing coal transportation should be expected from area residents.

F. Combined Modes

It is unlikely that a single mode would be used exclusively for transportation of coal to the FPL plant at Fort Myers. A single mode, such as a pipeline, could be used under some circumstances. Those circumstances, however, are not likely to occur here. The primary condition would be a large coal demand. As noted above, estimates of coal use after conversion do not indicate that such a condition would be met.

A combination of two modes is the most likely alternative. Among these would be the following:

1. ocean-going barge delivery to a Tampa area port with rail transport to Fort Myers,
2. ocean-going barge delivery to a Tampa area port with barge transport to Fort Myers,
3. ocean-going barge delivery to a Tampa area port with truck delivery to Fort Myers,

(For either the second or third combination, the initial ocean-going barge delivery could be to Port Boca Grande. Problems associated with truck transport from Boca Grande, however, would make the third combination most unlikely.)

4. unit train transport to the Tampa area with rail delivery to Fort Myers; short-haul truck delivery will be required if there is no rail connection to the FPL plant,
5. unit train transport to a Tampa port with barge delivery to Fort Myers,
6. pipeline transport to the Tampa area with rail delivery to Fort Myers,
7. pipeline transport to the Tampa area with truck delivery to Fort Myers,
8. pipeline transport to a Tampa port with barge delivery to Fort Myers, and
9. transport to the Tampa area by ocean-going barge, rail, or pipeline with pipeline delivery to Fort Myers.

Of the above combinations, the ones more likely to occur are the second, fifth, and eighth. These are considered more likely to occur because they would make use of facilities already in place in the Tampa area. In addition, there is also an existing demand for coal in that area. That demand itself is likely to increase as industrialization of the Tampa area continues.

The ninth alternative, in which a pipeline would be constructed from port facilities in Tampa to the Fort Myers plant, may appear to have lower costs. After all, the pipeline distance would be relatively short for the Fort Myers segment. Also, ocean-going barge transport and rail transport are already in use. The very existence of those other two transportation modes, rail and barge, would seem, however, to make this alternative unnecessary. It would likely be much more expensive to transport coal via a pipeline if the costs (monetary, environmental, and other) were compared with the costs of adapting either railroad or barge facilities to transport coal from Tampa to Fort Myers.

G. Other Combinations

In addition to single modes (e.g., barge or rail) and combined modes (e.g., barge and rail), there exists a somewhat different alternative. The various alternatives discussed above all

involve the transport of a new fuel, coal, to the Fort Myers plant. The alternative (actually four alternatives) reviewed here would use a different method of transport than is currently used, but would transport the same fuel, oil.

Four alternatives of this type have been presented by Seaboard Coast Line Railroad representatives. They are the following:

1. rail transport from refineries in Texas and Louisiana to Tampa, with truck or rail shipment from Tampa,
2. direct rail shipment to Fort Myers,
3. tanker or barge transport to Tampa, with truck or rail shipment from Tampa, or
4. shipment by the proposed Transco Pipeline to Kissimmee.(26)

In the context of this study, these four options all would have similar impact on this Region--increased rail or truck traffic on routes to and from the generating plant at Fort Myers. The method of fuel transport to Tampa is irrelevant unless that method directly affects transport within the Region.

The alternatives outlined here likely would each use the unit train concept at some point in the transportation process. The unit train used to transport fuel oil would consist of specially built tank cars. These cars would each carry about 26,000 gallons of fuel oil (or about 100 tons).(27)

The size of the unit train and its frequency of operation would be affected by the origin, route and destination. For example, under the alternative of rail transport from Gulf Coast refineries to Tampa, the unit train could be the first major link in the fuel transportation system. Since such a train would be supplying fuel for a number of generating plants, it would likely operate with the maximum feasible number of cars. This would be one hundred cars (the standard number for a unit train) or more, depending on circumstances.

Under the second alternative, a smaller unit train might be employed for the journey to Fort Myers. For this and similar uses, the larger unit train might not be feasible or necessary in order to supply a single generating plant. Unit trains of about one-third the larger size (as few as thirty cars) could be used.

This smaller unit train could be used for the rail shipment from Tampa in the third alternative. Truck shipment could also be used to complete the trip to Fort Myers. If trucks were used, the approximate capacity of each would be 7,500 gallons. This would mean that to transport an equivalent amount of fuel oil would require four times as many trucks as railroad cars.(28)

The fourth alternative would result in similar applications, depending on whether train or truck transport were used to move fuel oil from the pipeline terminus to Fort Myers.

It should be noted that even railroad representatives recognize limitations on rail transportation. Only one (the second) of the four suggested alternatives would rely exclusively on rail transport. The other three utilize rail transport and some other mode. The last alternative seems to be the best example of this. As noted above, the most likely transport alternative will combine two or more modes to achieve the flexibility needed to transport any fuel over long distances and under varied conditions. Seaboard officials apparently recognize that need and understand its importance.

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V. Impacts

In this chapter, potential impacts are addressed for likely transportation alternatives. The alternatives to be reviewed are the following:

1. barge,
2. rail,
3. pipeline,
4. coal-by-wire,
5. truck, and
6. combined modes.

In order to avoid duplication, the alternatives have been somewhat simplified. For example, there are some common impacts for barge transport of either coal or oil. Therefore, the impacts of the alternatives proposed by Seaboard Coast Line Railroad officials are reviewed under similar transport modes, although the former concerns oil while the latter deals with coal.

The assessment of impacts is limited to those impacts likely to occur within Southwest Florida. It is recognized that all of the listed alternatives have impacts beyond the borders of this Region. It is not within the scope of this study, however, to address those impacts. The regional impacts of the alternatives are summarized in Table 13.

Initially, it was thought that each transport alternative might be mutually exclusive. For example, if rail transport were used, it was assumed that the use of barge transport would be discontinued. That assumption has been discarded. The non-converted units of the power plant likely will continue to operate and will require fuel oil. Thus, it is possible for barges to continue bringing in oil while trains deliver coal. On the other hand, it is also possible for one transport alternative to be used to supply both coal and oil. As an example, trains could bring in coal and oil.

A. Barge

There are two possibilities involving barge transportation. The first is the continued shipment of oil by barge from Port Boca Grande to Fort Myers. The second is the shipment of coal by barge.

The first alternative represents no significant change over current conditions. There would be no increase in barge trips. This is a condition that could continue the next several years. At some point in the future, however, continued growth and development in Southwest Florida will push energy needs high enough to require greater generation. That, in turn, will result in greater fuel consumption by the FPL plant. Carried even further, the demand for electricity will eventually surpass the generating capacity of the existing facility. At that point, the

plant will have to be expanded or some part of the increased demand will have to be met by an existing facility elsewhere with unused capacity or by a new facility.

The second barge alternative, shipment of coal, would have both negative and positive impacts. Negative impacts would include the following:

- requirement for more land at the FPL plant for coal storage,
- potential for pollution from coal in storage and handling at the FPL plant, and
- increased number of openings of the Edison Bridge at Fort Myers.

Additional negative impacts would be generated if the port facility at Boca Grande ceased operation and fuel were to be delivered from a different port. Among those impacts would be increased potential for pollution and accidents along the new route and the loss of employment at Port Boca Grande.

Total employment due to the FPL oil operation is relatively small. As noted above, only five persons are at Boca Grande, two man the barges, and one offloads fuel at the FPL plat. In addition, there is one pilot at Boca Grande for the tankers.(1)

If barges were used to deliver fuel to a converted plant, they would have to pass through the Edison Bridge at Fort Myers. That bridge currently opens on signal for the fuel barges. The Bridge is closed to boat traffic Monday through Friday (except federal holidays) from 7:30 a.m. to 8:30 a.m. and from 5 p.m. to 6 p.m. At other times, the Bridge is opened to boat traffic on signal. Federal vessels, tugs with tows, and vessels in distress, however, are passed at any time.(2)

The impact of these additional openings would likely be minor or even positive. In 1982, the Edison Bridge opened 6,175 times.(3) (See also Table 14.) As noted above, approximately 260 barge shipments (about 420 barges in all as noted in Table 10) were required to supply fuel to the Fort Myers plant in 1982. These caused the Edison Bridge to be opened 520 times (once for the upriver trip and once for the downriver trip) or about 8.4 percent of the total.

To supply the estimated 1990 coal demand if the plant were converted could require from 274 barges to 410 barges. If those barges were transported as the oil barges are currently, the total number of shipments--and consequent bridge openings--would be no more than and perhaps less than under the existing situation.

Positive impacts would include the following:

- reduced pollution potential due to oil spills at Port Boca Grande, along the route to the FPL plant, and at the FPL plant,

- reduced potential for pollution, property damage, and personal injury or loss of life due to a hurricane or storm affecting Port Boca Grande, and

- reduced or eliminated tanker and barge traffic at Boca Grande with positive impacts on visual and aesthetic aspects of recreational activities such as the use of the beach, swimming, sunbathing, fishing, and sight-seeing.

It is difficult to classify some impacts as either positive or negative. This would depend upon future events. The impacts of the availability of Port Boca Grande and its facilities for other uses are an example. (Whether or not these would be positive or negative impacts would depend on any new use that might occur at the site. For example, if a chemical processing facility were to utilize the site, this could easily have the potential for severe environmental damage.)

B. Rail

The impacts that increased railroad traffic could generate are of concern. Some of those conflicts may not be resolvable. It is expected, however, that some advance knowledge of problem areas will aid in their solution. It should at least assist local governments, the railroad company, and others involved to reduce and mitigate those impacts and conflicts.

The impacts that may result from large trains could be substantial. Rail traffic in this area has generally declined. Formerly heavily used stretches of track have been abandoned. Therefore, if the Fort Myers power plant were converted to burn coal, and rail were used to transport the coal into the Region, there could be significant changes.

As discussed in other sections of this report, the rail alternatives cover several different options. These range from the use of rail as the sole means of transport to its use only for segments of the journey from fuel source to point of use. In similar fashion, the impacts of those alternatives will cover a broad range, whether the fuel being transported is coal or oil.

Increased rail traffic is likely to produce impacts and conflicts in the following areas:

a. delays and increased operating costs for highway users,
b. safety,

c. community barriers (physical and psychological),
d. environmental degradation,
e. incompatible or inappropriate land use, and
f. employment distribution.

Delays and increased operating costs for highway users will probably be the first impacts of increased rail traffic at highway and railroad grade crossings. The level of the conflict will depend on factors such as the following:

a. length (time) of traffic blockage,
b. amount of road traffic affected (including both at the immediate site and in the general area),
c. time of day (peak traffic or off-peak),
d. existence of alternate routes for highway users,
e. the purpose of the individual highway user's trip,
f. frequency of such events (how often is the road blocked by a train?), and
g. location of the site.

The second category of impacts is safety. This category would include both accidents and interference with emergency services. Accidents between road vehicles or pedestrians and trains would have two parts. The first would be those accidents that are the result of clear and direct conflict between road and rail users. Among these would be accidents such as the following:

a. a moving train striking a car, truck, or pedestrian or,
b. a car or truck striking a train.

The second group would be those accidents that might be classified as indirect. These would not directly involve trains. Examples of these would be the following:

a. a motor vehicle strikes another motor vehicle stopped at a railroad crossing while a train passes or
b. a driver, frustrated by the delay due to a train passing, attempts to find an alternative route and has an accident as a result of his haste, irritation at waiting, etc.

Interference with the provision of police, fire, and medical emergency services could be a significant problem. This issue would be more than simply the delay and inconvenience that an individual might experience due to having to wait for a train to pass. This would deal with situations such as the following:

a. movement of emergency service vehicles and personnel to an emergency situation such as fire or motor vehicle accident or
b. transport of injured persons to a medical facility.

This type of interference could easily have life-threatening consequences. Whereas a few minutes of delay might be only a matter of inconvenience in some situations, it would easily have serious consequences for emergency situations in which response times are

also measured in minutes.

Community barriers is a third issue. Heavily used rail line segments have traditionally been seen as a dividing line, often splitting a community into racial, social, and economic parts. In this study, it is assumed that existing railroad rights-of-way will be used. Even if substantial repairs or improvements were necessary to permit increased rail traffic, this would occur in an existing right-of-way. Thus, no new barriers will likely be created. Rather, the impact of those existing barriers could be increased, depending on the specific situation and circumstances of the rail traffic.

The fourth impact issue, environmental degradation, would affect several sites or locations. These would include the following:

a. all along the length of the railroad tracks used for fuel transport in the region,
b. at each grade crossing and point of rail/road conflict, and
c. at the point of unloading, handling, and storing of fuel at the generating plant.

In addition to this variety of impact or conflict sites, there would be a variety of impacts that might result in environmental degradation. Among these would be the following:

a. air pollution (train emissions and dust from train movements),
b. water pollution (similar to that associated with roads),
c. noise pollution,
d. aesthetics, and
e. solid waste disposal.

As noted above, it is assumed that there will be no significant new construction of track and that any repairs or improvements will occur on existing tracks and railroad facilities.

The fifth issue, incompatible or inappropriate land use, addresses conflicts that could occur at three separate types of sites (such as is the case with environmental degradation). It is also expected that land use impacts or land use incompatibility produced by increased rail traffic will already have existed to some degree. For example, if a residential land use is situated adjacent to the railroad tracks, some incompatibility already exists. If the land in question is zoned for a residential use, but is not occupied, that conflict may not be a significant problem. The potential for a problem, however, is there.

The sixth issue involves the redistribution of employment. Jobs would be lost by personnel associated with the barge operation and the fuel storage facility. Additionally, jobs related to the maintenance dredging would be lost since the U.S. Army Corps of Engineers would likely discontinue that dredging. There would be some added employment elsewhere due to increased train operations.

The use of rail transport could result in unit trains of thirty to one hundred cars in length. To supply the estimated 1990 coal demand of 410,000 tons per year for the Fort Myers plant could require as many as 137 train-loads of coal per year. (This is calculated on a unit train of thirty cars, each carrying one hundred tons. See Table 15.) At that rate, at least five unit trains would pass a point along the delivery route each week. This includes both the south-bound trip to deliver fuel and the north-bound trip back to the point of supply.

The length of the train should also be considered. A unit train of thirty cars, each carrying one hundred tons, would be at least 1,600 feet long. (This is the total length of the cars only. Locomotives and any other cars would increase the train length.)

C. Pipeline

In some respects, a pipeline would have less impact than other transport alternatives. The initial construction would involve significant impacts, but those would be restricted to the job site and would be short-term. Once operational, a pipeline would have almost no impacts. It would result in no additional wear and tear on bridges, roads, and railroads. It would add no traffic to the road system. It would not affect the environment. All of this assumes that it would operate without problems.

Pipeline construction, however, could have significant impacts, although those impacts would generally be local and short-term. Once a route has been secured and surveyed, construction is relatively straightforward. The land is cleared and graded. Each mile of pipeline would require that about twelve acres of land be cleared. This is based on a right-of-way of one hundred feet. In order to prevent root damage to the pipeline and to assure permanent access, all trees and large plants must be removed.

Sections of pipe and the necessary equipment are unloaded along the corridor. While that is being done, the trench is dug. The pipeline is likely to be buried at a depth of at least three feet below ground level. For stream or river crossings, the pipeline would be buried at least three feet below the stream bottom.(4)

Any pipe-bending that is required is performed. Sections of pipe are carefully positioned beside the trench. Pipe sections are welded together. After welding, the string of pipe is coated for corrosion protection and inspected. The pipeline is lowered into the trench, which is then covered and levelled. The last step is seeding of suitable grasses and general clean-up of the area.

A typical schedule for the work crews is ten to twelve hours per day, six days per week. The distance between the initial clearing and the final clean-up could be as much as forty miles. The work crews will move along the route at a rate of one to two miles per day.

Pumping stations will be needed approximately every seventy-five miles. As many as fifty workers may be involved in the construction of a pumping station for up to two years.(5)

The land area for a station may be as much as twenty acres. A dumping pond and a water supply will be required at each pumping station. The purpose of the dumping pond is to hold the slurry in case of a pipe break, pump failure, or other emergency.(6) A water supply is needed to fill the pipeline to carry the slurry to the next pumping station in case of pipeline water loss. As much as one hundred acre-feet or twenty-seven million gallons of water may be held in a freshwater make-up pond for this supply.(7) This will be equivalent to about 1.25 times the capacity of the next downstream pipeline section. The slurry dump pond would have to hold a similar capacity.(8)

Pipeline impacts can be divided into three general categories of construction, operation, and emergency. The construction period will be the time of the most obvious impacts. The clearing of the one hundred-foot wide corridor will disrupt wildlife and destroy trees. If the pipeline crosses wetlands, the natural flow of water can be disrupted, vegetation destroyed, and wildlife movement patterns altered. Water pollution problems can be created in crossing rivers, lakes, and streams. Construction of the right-of-way can provide easy access to previously closed areas for trespassing and illegal hunting. Problems with forest fires and illegal dumping may occur.(9)

Construction impacts of noise, activity, dust, and related factors will also occur. With normal safeguards, these impacts and those above can be overcome and kept to acceptable levels. While they may be significant in the short-term, most of these impacts will be over when construction is finished.

The period of pipeline operation will generally be the time of least impact. (This assumes that the operation will be normal and without incident.) The impacts of concern will occur at the pipeline terminal and the point of coal usage.

Due to high water tables, ponds for make-up water and holding ponds may have to be constructed above ground with levees or dikes to impound the water. A break or leak in the wall of one of these ponds could contaminate a large area if the pond were filled with coal slurry. Holding ponds filled with coal slurry might attract wildlife, especially waterfowl. The various compounds in the mixture could pose a health hazard to such animals.(10)

Major adverse impacts could occur in case of an emergency. For example, a pipeline leak, break, or pump failure could result in the spillage of the slurry mixture. The severity of a spill will depend on several factors. Among these would be the following:

1. the source of the water for the slurry,

2. the quantity of the spill,
3. the site of the spill,
4. the sensitivity of the site,
5. the period of time before clean-up operations could begin, and
6. the effectiveness of clean-up operations.

Water is a factor of concern because of the quantities involved. A coal-water mixture of 1:1 will need one ton of water to move one ton of coal. That ton of water will be about 240 gallons. Thus, a pipeline that transports 25 million tons of coal slurry annually will produce about 16.5 million gallons of water per day. This is equivalent to the quantity of sewage produced by 160,000 people.(11) The projected 1990 coal demand for the Fort Myers plant would be .41 million tons (410,000 tons) or 1.64% of 25 million tons.

The source of the water for the slurry mixture is the most important factor. It is possible that water will be taken from rivers near the beginning of the pipeline. According to one source, Ohio River water may be used. That water has been estimated to be in conflict with almost all Florida water quality standards. Sewage effluent may be another source. Depending on the level of treatment, that effluent could be a source of bacteria and organic material.

Other problems are posed by various chemicals and compounds added to the slurry mixture. These compounds would be used to inhibit corrosion, prevent settling of coal particles, maintain a proper pH level, and for other functions.(12)

Slurry water could contain excessive levels of total dissolved solids, sulfate, and biochemical oxygen demand. The U.S. Environmental Protection Agency has warned that BOD levels may be as high as those found in raw sewage. High levels of total dissolved solids and heavy metals are also seen as potential problems.(13)

The impacts of such severely polluted water could be significant. Fish, wildlife, vegetation, surface water, and groundwater could be affected by a spill. The water quality impacts could be especially problematic for three reasons. First, the pipeline will likely be buried. Second, the pipeline is likely to cross numerous lakes and wetland areas. Third, even if no surface water were present, groundwater levels are close to the ground surface in many areas, especially during wetter periods of the year.

D. Coal-by-Wire

The impacts of coal-by-wire will fall primarily on the area in which the electricity is generated. Therefore, impacts expected to occur in Southwest Florida would generally be associated with the construction and maintenance of the transmission lines and rights-of-way.

Right-of-way width requirements could range from one hundred and forty feet to seven hundred feet. The former would utilize seventeen acres of land per mile of powerline while the latter would use eight to five acres per mile.

Just as with pipelines, the right-of-way would be cleared of all trees and brush. In addition, trees outside the right-of-way but posing a danger to the transmission lines or towers would be removed. Depending on the circumstances, this type of clearing in a wider right-of-way would be more destructive than in the case of a pipeline.

On the positive side, the ground would not be cleared of all low growth and no pipeline trench would be dug. (Some digging would be necessary, however, for the foundations of the support towers.) In fact, some agriculture may be allowed in the right-of-way if it had occurred there previously.

Impacts on water resources should be reduced substantially, mostly due to the lack of trenching, especially in crossing streams and wetlands. Those benefits may be partially offset by the construction of access roads. If the general practice of providing access to every structure in the right-of-way were followed, each mile of transmission line would result in an average of one-eighth mile of access road. For Southwest Florida, access roads in wetlands could pose significant problems due to their impacts on water flow. Other problems such as trespassing, illegal hunting, fires, and illegal dumping could result from unauthorized use of the access roads.

Transmission lines would have visual impact. Large lines and the necessary support towers are definitely not consistent with natural sights. They could be placed away from populated areas and highways. That, however, would increase the impacts on natural areas, wetlands, and other undeveloped areas. That would also require the construction of more access roads.

While these structures cannot be easily hidden from view, they can be partially screened by careful plantings of trees. For trees to reach a height adequate to provide screening, however, will require years.

The land clearing activities in the right-of-way may include the use of herbicides to reduce or eliminate the growth of unwanted vegetation. Such chemicals are to be used carefully in any situation. In areas such as sensitive wetlands, their use should be monitored carefully and avoided if practical.(14)

E. Truck

The impacts associated with truck transport of coal would generally be similar to those of trucks used for the transport of other materials. For example, a truck carrying twenty tons of sand, phosphate ore, or gravel will cause just as much

deterioration of the roads in the Region as would a truck carrying a similar quantity of coal. Weight restrictions, speed limits, and traffic laws would affect all heavy trucks in similar fashion.

The impact issue would, therefore, be one of the number of heavy vehicles added to the traffic rather than the type of impact associated with that vehicle. That is, it will be a question of more wear and tear on roads, more noise, more air pollution, and more traffic. All of those problems currently exist. The use of heavy trucks for coal transportation will add more of the same types of impacts.

If trucks were to carry a maximum of twenty-six tons of coal per trip, to supply the projected coal demand of 410,000 tons in 1990 would require 15,770 deliveries. Each truck would, of course, have to return to the point of coal supply. Thus, the 15,770 deliveries would be doubled to 31,540 trips. In other words, in a year, any location along the route used by the trucks would be passed by a full coal truck 15,770 times and an empty coal truck 15,770 times. Altogether, a coal truck would pass that point 31,540 times per year or about eighty-seven times per day for every day of the year. To achieve that number of trips, the power plant would have to receive trucks at the rate of about four per hour or one truck about every seventeen minutes.

There is one route that might be followed if trucks were used to supply coal to the FPL power plant at Fort Myers. It would originate in the Tampa/Port Manatee area where coal would be delivered either by rail, barge, or ship. From that supply point, coal trucks would take I-75 south. At Fort Myers, the trucks would exit I-75 and travel east on State Road 80 to the power plant site.

At present, I-75 is not a congested road. State Road 80, however, is congested. In 1983, S.R. 80 had an average daily traffic count of 16,167. (This count was made at a point on S.R. 80 on the east side of the Orange River, i.e., east of I-75.)(15) At this number of vehicles, S.R. 80 was operating at level of service "E". (Level of service is a measure of the actual traffic on a road segment as compared to its design capacity. Level of service "A" occurs when there is relatively little traffic with most of the capacity unused. A desirable level of service is "C." "E" is undesirable. At that level, the road segment has more traffic than it was designed to carry.)

Construction to add two lanes to the segment of S.R. 80 between I-75 and S.R. 31 is scheduled to begin in 1987-88. It should be completed before 1990.(16) The average daily traffic projected for 1990 is approximately 21,000. That increased traffic would be offset by the increased capacity of four lanes and related improvements. Consequently, S.R. 80 would likely be operating at about level of service "B."(17)

For the purpose of this project, 1990 has been assumed to be the

first year of operation for the converted power plant. As noted above, the coal trucks would add about eighty-sever trips per day (about 31,540 per year) to the highway. The impact of those trips would be relatively minor in light of the planned increased capacity of the road.

It is possible that the trucks would not operate around the clock. For example, the operation of the trucks could be confined to ten hours a day for five days a week. While this would not change the total number of trips, it would concentrate them into a smaller time period. If that period of operation were to be during the week (i.e., Monday through Friday) and during the day, however, the truck traffic could have greater impact. There would be more trucks per hour during the times of normal traffic.

The major problems of noise and air pollution could be partially addressed through state and local regulations, stricter laws, and careful enforcement of existing laws. This would, for example, prevent problems of excessive truck noise due to faulty mufflers. Air pollution could be reduced if the coal were washed, wetted, and covered to prevent coal dust from escaping. Also, the trucks should be well maintained and efficiently operated.

F. Combined Modes

Combined modes of fuel transportation for both oil and coal are presented in other parts of this report. All of those combinations are based on one or more of the alternatives discussed in earlier sections of this part. Therefore, the potential impacts of those combinations have already been reviewed.

References for Part V

(1) Steve Kaskovich, "...But How Important Is Deepwater Port to Lee's Future?" Fort Myers (Florida) News-Press , 19 February, 1984, pp. 1G and 3G.

(2) U.S. Coast Guard, Final Rule, "Drawbridge Operation Regulations; Navigable Waterways of the United States," Federal Register 49, no. 80, 24 April 1984, 17467.

(3) Florida Department of Transportation, Maintenance Department, Bartow, Florida, personal communication, 7 May 1984.

(4) Report , pp. 7-5 and 7-6.

(5) Robert J. Halstead, pp. 100, 103, and 104.

(6) Barney L. Capehart, p. 3-24.

(7) Ibid., p. 3-33.

(8) Report , pp. 7-5 and 7-9.

(9) Barney L. Capehart, pp. 3-26 and 3-29.

(10) Report , pp. 7-12 and 7-16.

(11) Ibid., p. 7-8.

(12) Barney L. Capehart, p. 3-29.

(13) Robert J. Halstead, p. 105.

(14) Report , pp. 7-31--7-33.

(15) Florida Department of Transportation.

(16) Lee County Transportation Improvement Program: 1984-1989.

(17) SWFRPC staff estimates.

VI. Policy Assessment

A. State

1. Charlotte Harbor Resource Management Area

The Charlotte Harbor area has received considerable attention in the last ten years. (See Figure 7.) In 1975, the Environmental Confederation of Southwest Florida nominated it as an area of critical state concern. The Southwest Florida Regional Planning Council, Sarasota County, Charlotte County, Punta Gorda, Naples, and Sanibel joined in supporting the nomination.

Protection of the estuarine resources of the area was a major concern that led to the nomination. There were other concerns that went beyond that primary issue. Those concerns included the rapid, premature, almost uncontrolled subdivision of land and competition for freshwater.

In early 1978, it was decided to rely on an intergovernmental program without a critical area designation. The Charlotte Harbor area was selected in order to examine the statewide issues in a specific location. It was experiencing nearly all of the problems identified in the general statewide problem statement. Staff was directed to complete its finding-of-fact report and to consider a resource planning and management program.

The Charlotte Harbor program received Governor Graham's endorsement in early 1979. The study area was expanded to encompass the entire counties of Lee, Sarasota and Charlotte. It was felt that development inland would generate significant impacts on the estuarine areas through alterations of the natural eco-system. The Charlotte Harbor Resource Planning and Management Committee first met in June of 1979. A Technical Advisory Committee was appointed to assist in the identification of problems and recommendations for solving them. In July, the Committee adopted the goals and problem issues. Four issues were selected for further study: problems associated with water resources, natural systems, community infrastructure, and intergovernmental coordination and decision-making. In June of 1980, the Committee submitted its report of the major problems, along with recommendations for possible solutions.

A second Committee appointed in July developed a management plan based on the recommendations of the original committee. This committee formally adopted the Charlotte Harbor Management Plan on June 5, 1981. Each local government in the three-county study area has now incorporated the Plan into its respective local government comprehensive plan.

The plan adopted in 1981 has two goals and a number of objectives. Those goals are listed below, followed by

relevant objectives.

1. To maintain and improve the functional and structural integrity of the natural estuarine eco-systems and related coastal components through coordinated management of human impacts in surrounding uplands and freshwater systems.

2. To identify and address the impact of growth so as to minimize or eliminate any adverse effects on the Charlotte Harbor area.

Objective #1: Policy consistent with the Charlotte Harbor Committee goals and objectives should be incorporated in all public plans relating to the Charlotte Harbor area.

Objective #4: Future development in floodplain areas is to occur only in a manner consistent with the function of floodplains.

Objective #5: The stormwater and drainage systems of the Charlotte Harbor area are to function in a manner that protects and preserves the Charlotte Harbor estuarine system.

Objective #6: Permitting and inspection processes for wastewater management should be improved to assure that future development does not result in unavoidable pollution of estuarine and freshwater systems.

Objective #7: Predictable impacts of development within wetland areas should be mitigated or prevented through a prior planning process.

Objective #8: The barrier islands and beaches of the Charlotte Harbor area should be managed as a whole, recognizing that any developmental activity potentially affects the processes of the entire barrier beach, barrier island, and pass systems.

Objective #9: Existing and future water needs of the natural systems, areas of existing and projected population growth, and agricultural areas are to be met.

Objective #10: Future land development decisions by local government should be in accord with the goals and objectives of the Charlotte Harbor committee, and existing platted areas should also be encouraged to develop in accord with these goals and objectives.

Objective #11: Mitigation and prevention of development impacts should be initiated during site planning and site alteration processes.

Objective #12: Predictable dredge and fill impacts within the Charlotte Harbor area should be minimized through a prior planning process.

Objective #13: Existing and future water and natural system problem areas should be restored to healthy conditions, where practical and necessary for the quality of the estuarine system.

Objective #14: Coastal areas should be managed in a manner which minimizes the threat to life and property caused by tidal flooding.

2. Charlotte Harbor Aquatic Preserves Management Plan

In addition to the Charlotte Harbor Resource Plan, there is a recently adopted management plan for four aquatic preserves in the area. On May 18, 1983, the Governor and Cabinet adopted the Charlotte Harbor Aquatic Preserves Management Plan. The Plan designates four aquatic preserves as wilderness preserves in which "...the primary management objective will be the maintenance of these eco-systems in an essentially natural state..."(1)

The preserves are Cape Haze, Gasparilla Sound-Charlotte Harbor, Matlacha Pass, and Pine Island Sound. (See Figure 8.) These four preserves are part of the Charlotte Harbor estuarine system found in Charlotte and Lee Counties.(2) The water route currently used to supply fuel oil to the FPL plant at Fort Myers passes through three of the preserves. Several of the alternatives discussed elsewhere in this report would similarly affect these preserves.

Under the plan, "essentially natural conditions shall be identified and resources restored to that condition where possible."(3) The plan contains twenty-two major policies. Those of special importance for this project are presented here:

A. Prohibit the disturbance of archaeological and historical sites within the aquatic preserves, unless prior authorization has been obtained...

B. Manage all submerged lands within the aquatic preserves to ensure the maintenance of essentially natural conditions, the propagation of fish and wildlife, and public recreation opportunities.

D. Protect, and where possible, enhance threatened and endangered species habitat within aquatic preserves.

E. Prohibit development activities within aquatic preserves that adversely impact upon significant grass beds, unless a prior determination has been made by the Board of overriding public importance with no

reasonable alternatives, and adequate mitigation measures are included.

(The "Board" referred to above and below is the Governor and Cabinet of Florida, sitting as the Board of Trustees of the Internal Improvement Trust Fund.)

F. Prohibit the trimming and/or removal of mangroves and other natural shoreline vegetation within the aquatic preserves, except when necessitated by the pursuit of legally authorized projects.

I. Prohibit the drilling for oil and gas wells, the mining of minerals, and dredging for the primary purpose of obtaining fill, within the aquatic preserves.

J. Prohibit non-water dependent uses of submerged lands within aquatic preserves except in those cases where the Board has determined that the project is overwhelmingly in the public interest and no reasonable alternatives exist. This prohibition shall include floating residential units, as described in Section 125.0106,F.S.

K. Prohibit storage of toxic, radioactive, or other hazardous materials within the aquatic preserve.

N. Prohibit the construction of new deep water ports within the aquatic preserve boundaries.

P. Manage state-owned spoil islands within aquatic preserves as bird rookeries and wildlife habitat areas.

Q. Encourage public utilization of the aquatic preserves, consistent with the continued maintenance of their natural values and functions.

U. Apply the management criteria contained in the adopted Charlotte Harbor Aquatic Preserves Management Plan to all subsequent legislative additions of land to these aquatic preserves.(4)

B. Regional

1. Introduction

The Southwest Florida Regional Planning Council is one of eleven such agencies in Florida. It covers the following counties: Charlotte, Collier, Glades, Hendry, Lee, and Sarasota. As an advisory and coordinating agency, the Regional Planning Council assists constituent local governments in regional, metropolitan, county, and municipal planning matters such as land use, water resources, and transportation. Its functions are performed either in the

interest of the public or for public purposes involving the expenditure of public funds. The Regional Planning Council forms a vital link between local governments and the state and federal governments through the preparation of plans and reports and the provision of technical assistance. It also serves as a forum for local governments in Southwest Florida. This facilitates the airing of problems of greater than local concern and the development of plans and programs to address these problems.

The Southwest Florida Regional Planning Council has rules (goals, objectives, and policies) under which it operates. Since the Council does not have regulatory or taxing authority, it performs an advisory role under these rules. The overall Council goal is the protection and improvement of the total environment of Southwest Florida. There are ten sub-goals that address various aspects of the total environment. Each of these is further divided into objectives and policies which provide guidance for Council actions. These ten sub-goals are as follows:

1. economic,
2. environmental protection,
3. housing,
4. land development,
5. transportation,
6. disaster preparedness,
7. support services,
8. intergovernmental coordination,
9. water resources, and
10. energy conservation.

Council rules have been reviewed to determine those that might affect any of the transportation alternatives discussed in this report. Selected goals, objectives, and policies are presented on the following pages.

2. Goals, Objectives, and Policies

291-2.02 ECONOMIC GOAL. To achieve a balanced economy which can absorb and adapt to growth.

(2) Objective: Broaden the economic base in a manner that is compatible with the character of the region.

Policies:

(a) Encourage new development to occur in a manner which does not adversely affect the commercial and sport fishing industry.

(3) Objective: Make the wisest and best use of the region's human and natural resources.

Policies:

(b) Discourage economic activities that waste or degrade natural human resources.

(c) Encourage programs that would maintain a continued maximum yield of marine life necessary for commercial and sports fishing.

(4) Objective: Ensure that public services and facilities necessary for economic development are available when needed.

Policies:

(e) Encourage local planning programs to designate areas suitable for commercial and industrial growth and development.

291:2.03 ENVIRONMENTAL PROTECTION GOAL. To protect and improve the air, water, and earth resources of Southwest Florida for present and future populations.

(1) Objective: Encourage the wisest use of resources and the protection of the environment of the region.

Policies:

(h) Encourage local governments to reject proposals for development in the coastal zone that threaten to degrade the quality or hamper the productivity of estuarine and bay environments.

(i) Encourage the state and local governments to adopt regulations that protect mangroves, estuaries, and salt marshes to ensure the continual functioning of the coastal eco-system.

(j) Encourage local governments to protect coastal waters capable of supporting shellfish harvesting (Class II waters) by requiring developers to retain, on-site, wastes generated by development in order to prevent actual or potential degradation of water quality.

(k) Encourage the protection of marine grass beds.

(w) Encourage the restoration of any beach, shoreline, or other waterfront, shorefront, or coastal site to its natural condition as soon as possible after any crossing, use, or other damaging activity.

(2) Objective: Assist the local and state agencies in the development of air quality management plans in the Region.

Policies:

(d) Encourage local governments to develop strong air quality discharge standards relevant to the needs of their community, but coordinated with the needs of adjacent affected communities.

(3) Objective: Assist in the control and elimination of noise pollution.

Policies:

(a) Encourage local governments to establish noise pollution ordinances and enforcement programs.

(b) Encourage the use of noise abatement structures between noise generating sources and areas of pollution concentration.

(c) Encourage the use of natural landscape and landscape and vegetation as noise abatement measures.

(d) Encourage the location of large noise generating sources away from population centers.

291-2.05 LAND DEVELOPMENT GOAL. Have land use activities consistent with natural land characteristics.

(1) Objective: Open space areas in the Region should have their value protected through land planning and conservation.

Policies:

(b) Encourage state and local land development plans to protect significant natural resources and wildlife habitats, in particular, habitats of endangered species.

(e) Discourage development which occurs adjacent to State Aquatic Preserves from disturbing any high marsh areas or mangroves adjacent to the aquatic preserve or an environmentally significant area.

(2) Objective: Preserve significant historical and archaeological sites in the Region.

Policies:

(b) Encourage developments to preserve all significant historical and/or archaeological sites within their boundaries.

(e) Encourage local governments to protect historical and/or archaeological sites from possible adverse

effects of surrounding land uses.

(4) Objective: Limit urban expansion to those areas most suitable for new development.

Policies:

(f) Encourage grouping of industrial and commercial uses at points of high transportation accessibility.

(g) Encourage local governmental plans to recognize and prioritize the needs of surface water-dependent and related land uses along the shorelines.

(5) Objective: Establish high quality urban design standards.

Policies:

(c) Encourage the use of effective buffering (use buffer or landscape buffer) to ameliorate any incompatibility between land uses.

(e) Encourage local governmental plans to recognize the needs and ensure sufficient buffers for those intensive land uses such as power plants and ports which are incompatible with most other land uses, but are a part of the community.

291:2.06 TRANSPORTATION GOAL. Develop a responsive and balanced comprehensive regional transportation system that properly integrates all methods of transportation in the region with existing and potential land use needs.

(1) Objective: To encourage all units of government to participate in a continuous comprehensive transportation planning program that properly considers all methods of transportation.

Policies:

(e) Encourage all units of government to encourage the protection and maintenance of the intracoastal waterways, interconnecting channels, and related port facilities.

(g) Encourage land use planning efforts of all levels of government to address the land needs of water-borne commerce and traffic.

(h) Encourage the establishment of a minimal number of suitable corridors for pipelines for both onshore and offshore needs.

(2) Objective: Encourage and implement mass transit and mass

carrier systems oriented to the users whenever economically feasible.

Policies:

(a) Encourage the use and continued operation of present rail and transit facilities.

(4) Objective: Assist in the protection of the traffic-carrying capacity of major streets and roads, major interchanges and intersections.

Policies:

(a) Encourage all local governments to design, upgrade, and maintain all transportation systems to enable roadways to operate at, or above, Level of Service "C" (as defined and used by the Florida Department of Transportation).

(5) Objective: Encourage the development of a well-planned transportation system that would protect the environmental and ecological systems of the Region.

Policies:

(a) Discourage the construction of transportation facilities what would disrupt natural sheetflow or disrupt the Region's wetlands or aquifer recharge areas.

(b) Discourage the construction of transportation facilities that would have an adverse effect on significant wildlife habitats and animal refuge areas.

29I-2.08 SUPPORT SERVICES. Ensure that support services and facilities are adequate for the needs of present and future populations.

(3) Objective: Ensure that governmental regulatory programs are coordinated with planning programs concerned with the provision of support services.

Policies:

(d) Encourage state and local governments to encourage the establishment of on-site treatment of industrial wastes.

29I-2.10 WATER RESOURCES. Protect and enhance the water resources of the region.

(1) Objective: To provide for the most effective management

possible of the water resources of the Region.

Policies:

(f) Discourage development that is not part of, or consistent with state, district, and local comprehensive water management plans.

(2) Objective: To prevent the destruction of aquifer recharge areas.

Policies:

(a) Encourage the evaluation of land development and water management proposals in terms of their probable total effect upon the land's ability to recharge the aquifer system.

(3) Objective: To prevent the contamination of the Region's groundwater resources.

Policies:

(b) Discourage sewage treatment plants, industrial holding ponds or other potentially polluting facilities from being constructed unless adequate precautions are made to prevent contamination of leaching, especially in the event of flooding.

(f) Discourage the construction of canals which would contribute to saltwater intrusion.

(g) Encourage the use of generally accepted Best Management Practices to reduce or prevent groundwater pollution, particularly in aquifer recharge areas.

(4) Objective: To prevent the contamination of the Region's surface waters.

Policies:

(d) Encourage increased on-site retention of stormwater runoff, to improve surface water quality, increase percolation of rainwater into the ground, and reduce the demands of primary drainage canals.

(e) Encourage the establishment of natural vegetation buffer zones and gradually sloping berms away from artificial waterways in order to prevent the direction of contaminants into adjacent water bodies.

(f) Encourage the establishment of specific water runoff control measures for developments located adjacent to waterways.

(5) Objective: To provide adequate supplies of water for all uses.

Policies:

(g) Encourage the utilization of non-potable water for the cooling of electrical generating plants.

29I-2.11 ENERGY CONSERVATION GOAL. Promote and develop the most effective, efficient, and economical uses of all forms of energy available to Southwest Florida.

(4) Objective: Encourage improved facilities planning.

Policies:

(c) Encourage public facilities plans which are consistent with transportation and energy conservation objectives.

(e) The character, location, and timing of the development of energy and energy-related facilities should be planned so as to minimize adverse environmental, economic, and social impacts.

3. Developments of Regional Impact

Some of the facilities needed in the various alternatives may also be subject to a process that incorporates review by agencies at the state, regional, and local levels. Under the Florida Environmental Land and Water Management Act (Ch. 380, F.S.), a development that meets certain criteria can be designated a Development of Regional Impact (DRI). Generally, a development would be designated as a DRI if it "would have a substantial effect upon the health, safety, or welfare of citizens of more than one county." (Ch. 380.06, F.S.) Although created under state statute, DRIs are discussed in this section because the process occurs at the regional level with the regional planning council as the primary vehicle. The regional planning council follows a format established under state law while also utilizing the policies adopted by itself and the affected local government(s).

Twelve types of projects are generally presumed to be DRIs (assuming they are of sufficient size or impact). They are as follows:

airports,
attractions and recreation facilities,
electrical generating facilities and transmission lines,
hospitals,
industrial plants and industrial parks,

mining operations,
office parks,
petroleum storage facilities,
port facilities,
residential developments,
schools, and
shopping centers.

Within the statute, there is a brief description of the thresholds for these projects. For example, an industrial plant or park would be a DRI if the proposed facility would provide parking for more than 1,500 motor vehicles or occupy a site greater than one square mile. Even if a facility were below the threshold, it could still be a DRI depending on the circumstances of the specific site and the potential impacts of the facility.

Of interest in this study are four of the DRI types. They are listed below with the threshold for each:

- electrical generating facilities and transmission lines (27F-2.03)

(1) Any proposed steam electrical generating facility with a total generating capacity greater than one hundred (100) megawatts, or a proposed steam addition to an existing electrical generating facility, which addition has a generating capacity of greater than one hundred (100) megawatts; except that this paragraph shall not apply to a facility which produces electricity not for sale to others. Generating capacity shall be measured by the manufacturer's rated "name plate" capacity.

(2) Any proposed electrical transmission line which has a capacity of two hundred thirty (230) kilovolts or more and crosses a county line.

Provided, however, that no electrical transmission line shall be considered as falling within this standard if its construction is to be limited to an established right-of-way, as specified in Subsection 380.04(3)(b), Florida Statutes.

- industrial plants and industrial parks (27F-2.05)

Any proposed industrial, manufacturing, or processing plant under common ownership, or any proposed industrial park under common ownership which provides sites for industrial, manufacturing, or processing activity, which:

(1) provides parking for more than one thousand five (1,500) motor vehicles; or
(2) occupies a site greater than one (1) square mile.

- petroleum storage facilities (27F-2.08)

(1) The following developments shall be presumed to be developments of regional impact and subject to the requirements of Chapter 380, Florida Statutes:

(a) Any proposed facility or combination of facilities located within one thousand (1,000) feet of any navigable water for the storage of any petroleum product with a storage capacity of over fifty thousand (50,000) barrels.

(b) Any other proposed facility or combination of facilities for the storage of any petroleum product with a storage capacity of over two hundred thousand (200,000) barrels.

(2) For the purpose of this section, "barrel" shall mean forty-two (42) U.S. gallons.

- port facilities (27F-2.09)

The following development shall be presumed to be a development of regional impact and subject to the requirements of Chapter 380, Florida Statutes:

The proposed construction of any water port, except those designed primarily for the mooring or storage of watercraft used exclusively for sport or pleasure of less than one hundred (100) slips for moorings.

Designation of a facility or development is important because it triggers a careful review process that supplements local review. The regional planning council serves as the chief reviewing agency while also providing coordination among relevant state, regional, and local bodies. This is significant because a wide variety of expertise is brought to bear on the DRI. The regional planning council develops a set of recommendations for the proposed project. It should be noted that the regional planning council can only recommend and not require or regulate. The local government with jurisdiction over the DRI site actually has final authority.

4. Other

Regional policies directly affect only the operation of the Regional Planning Council itself. Their impact on local, state, federal, or other regional agencies is indirect. As noted above, regional planning councils in Florida have no regulatory authority, but are strictly limited to an advisory role.

Impacts on various activities and projects occur via Council reviews of such activities and projects and their permit applications. For example, Council staff utilizes Council policies to review a project. The full Council acts on

staff conclusions and makes recommendations to the local, regional, state, or federal agency with jurisdiction or permitting authority over the project as to its acceptability, suitability, and conformance with Council rules.

In addition to these goals, objectives, and policies, Council utilizes the Charlotte Harbor Resource Management Plan discussed above. This Plan is consistent with Council efforts to protect Charlotte Harbor.

C. Local

1. Introduction

The comprehensive plans of relevant local governments in Southwest Florida were reviewed for goals, objectives, and policies that could be of importance for coal transportation. Public policies governing land use are found in the local government comprehensive plans, each of which is an adopted ordinance of the result of a process of public debate and discussion. Industrial land use policies are usually rather general. For example, the type of industry or industrial land use that would be acceptable to most local governments would have to be nearly ideal. This would be clean, small scale, high technology, nonpolluting industry that would provide stable employment and high pay scales.

Based on review of the various transportation alternatives, the local governments most likely to be affected are Charlotte County, Punta Gorda, Lee County, and Fort Myers. (The first two have a combined plan.) Lee County and Fort Myers would likely experience more impacts than other areas because of the location of the FPL generating plant. For rail transportation, all four of these local governments would experience increased rail traffic because of the location of the rail line. For water transportation alternatives, impacts would vary according to the specific alternative. It appears likely, however, that Lee County and Fort Myers would have more impacts, although Sanibel and Cape Coral may also be affected.

2. Goals, Objectives and Policies

The goals, objectives and policies of each local government in the Region that might affect the various alternatives are listed in this section. These were derived from local government comprehensive plans.

a. Charlotte County/Punta Gorda Comprehensive Plan

Economic Goal: Promote community economic efforts toward expanding employment opportunities for citizens of all ages and improvement of economic stability through diversification of the economic base.

Industrial Land Use Goal: To encourage the orderly development of the industrial park and other industrial acreage in order to minimize conflicting land uses.

Objective 2: Encourage non-polluting industry that produces a minimum of adverse environmental affects.

Objective 3: Encourage the location of new industrial parks and districts near primary thoroughfares.

Objective 5: To protect residential areas from encroachment of industrial activities, regulations dealing with screening, buffer strips, open space and setbacks will be employed.

General Policies

* Industrial lands developed as a park will be limited to manufacturing, warehousing, and related activities that are conducted so the noise, dust, odor, and glare of each operation is completely confined within an enclosed building. The size and volume of traffic generated by these uses should be less than that generated by medium or heavy industrial activity. Buildings and improvements should be architecturally attractive, surrounded by landscaped yards, and screened from other uses when appropriate.

Coastal Zone Policies

* Encourage the implementation of water quality management planning.

* Require economic assessments of coastal projects to measure the contribution of the natural system that may replace, to the regional economy.

Ecological Principles

* To incorporate the concept of air pollution impact in industrial zoning.

* To encourage the development of a county wide stormwater runoff management plan to include flow regulation and practices for reducing pollution loads.

* Preserve to the greatest extent practicable fresh water recharge areas.

Transportation Policies

* Developers will be required to dedicate the rights-of-way and make the improvements necessary, according to the Thoroughfare Plan, for the portions of the route falling within their development proposal. Developers will be required to make the necessary intersection and signalization improvements that are necessary to ensure that the project has adequate access without sacrificing the carrying capacity of the connected route.

* The Traffic Circulation Plan for Charlotte County and the City of Punta Gorda is related and shall consider the environmental problems that are often encountered, including the following: blockage of light and air; noise pollution; air and water pollution; interruption of the hydrological system; and degradation of the biological system.

Electrical Unit Policies

* Stay informed of future power plant sitings in Charlotte and adjacent counties so as to be able to mitigate any adverse environmental impacts.

b. Lee County Comprehensive Plan

Community Facilities and Services

Goal 9: To provide adequate, reliable, efficient and cost-effective levels of electric power to all Lee County residents and visitors.

Objective 40: Encourage the proper location and landscaping of substations and powerline easements to provide minimal adverse effects on adjacent land uses.

Land Use

Goal 11: To utilize the land for man's activities in a manner consistent with the natural environment, while providing improved living and economic conditions for both present and future citizens of Lee County, by striving for a land use decision-making system that takes into account the separate and inter-related concerns of consumers, producers, and the government alike.

Objective 56: Facilitate the movement of goods by improving the efficiency and expanding the capacity of the surface road network maintaining and, where possible, improving railway, port and airport facilities and services.

Policy 28: It shall be the policy of the Board of County Commissioners of Lee County to recognize:

b. the special relation between land use and quality of water, and give special consideration in the review and permitting of all new developments;

c. that the unique environment of Lee County can pose limitations on urban and suburban development.

Policy 32: It shall be the policy of the Board of County Commissioners of Lee County to prepare development regulations that:

c. encourage:

(1) industrial development in locations having immediate or direct access to one or more of the following:

- major highways
- railroads
- air freight facilities
- marine transport

Policy 35: It shall be the policy of the Board of County Commissioners of Lee County to encourage, support, or promote:

c. commercial aviation and shipping port facilities designed and located consistent with the needs of Lee County and compatible with surrounding land uses.

c. Fort Myers Comprehensive Plan

Traffic Circulation System Goal: To provide the most efficient, economical, integrated traffic circulation system for the movement of people and goods within and through the Greater Fort Myers area with the minimum congestion and travel time and the maximum safety for resident and non-resident alike.

Strategy 3: Protect and encourage non-automotive traffic circulation.

c. Facilities (lines and spurs) for rail traffic will be protected and encouraged in instances which would reduce the amount of truck traffic or where rail traffic would provide other tangible benefits, such as economic development.

e. Facilities for water-related traffic will be encouraged and protected, both for commercial and recreation purposes, within the existing jurisdictional limitations.

Economic Development Element Goal: To strengthen the economic system of the Greater Fort Myers area, especially the economic

base, the prospects for growth and stability, and the opportunities for employment.

Strategy 3: Develop a transportation network that will foster the development and expansion of all industry and commerce, with Fort Myers as its hub.

c. Support the continuance of the Atlantic Coast Line Railroad system, its lines, yards, spurs, and service to the commercial and industrial sections of Fort Myers.

e. Encourage and protect water transportation routes to the extent that they are used in connecting Fort Myers with other commercial trade markets, serve local commerce and industry, and provide an avenue of tourist access.

Power Generation and Transmission Siting Goal: To protect the general public interest in Fort Myers as it may be affected by the provision of power to the community by the Florida Power and Light Company.

Objective 1: To support Florida Power and Light's timely and economic provision of an adequate power supply to the present and future customers in the Greater Fort Myers area.

Objective 2: To ensure that the location of power customers, and the siting of the necessary power generation plants, transmission facilities, and distribution facilities continue to be consistent with the Fort Myers Land Use Plan, and continue to have minimum adverse impacts.

3. Summary

Most local governments in Southwest Florida encourage economic development. Their efforts, however, tend to focus on an ideal industry that would offer high wages and employ large numbers of workers but have relatively little negative impact. This would exclude the traditional "smokestack" industries.

There is a definite concern by citizens and elected officials alike that heavy industry would harm other aspects of the regional economy, especially tourism and retirement. Most local governments tend to favor commercial development by offering a number of commercial zones. Industrial uses, however, are generally confined to one or two zoning categories.

In addition, there are a large number of environmental standards found in zoning regulations. Examples are seen in the performance standards regulating such things as excessive noise, vibration, smoke, and other particulate matter, radiation, odors, toxic or noxious matter, fire and explosive hazards, and industrial wastes. These standards governing industrial development are particularly common in communities in the two northern coastal counties of Charlotte and Sarasota. Elsewhere, there are ordinances restricting air and water pollution,

dredging and filling, and excavating.

Several areas use ordinances for planned unit developments to regulate industry, creating planned industrial developments (PIDs). Such development practices allow flexibility to the developer, while at the same time granting stronger control over industrial projects to the local government. PIDs also allow essentially unattractive land uses to be buffered from neighboring land uses in a better manner than conventional industrial zoning.

Charlotte County has two industrial zones. They are as follows:

> IL (Industrial, light) - This zone is intended for light manufacturing, processing, storage and warehousing, wholesaling, and distribution.
>
> IG (Industrial, general) - This zone is primarily for manufacturing and related uses.

There is also a Planned Development zone designed to encourage concentrated, energy-efficient land development through the use of innovative land use planning and structural design techniques. Conventional zoning requirements are replaced by flexible performance requirements.

Those industrial performance standards would probably limit larger-scale, potentially polluting, facilities. A County land use policy specifically limits industries in industrial parks to "activities that are conducted so the noise, dust, odor, and glare of each operation is completely confined within an enclosed building." County policies encourage "non-polluting industry that produces a minimum of adverse environmental effects."

Punta Gorda has two industrial zones. They are as follows:

> IP (Industrial Park) - This district is used for industrial activity. Its purpose is to promote more efficient and economical land use, harmony in physical design and industrial relationships and variety and amenity in industrial development while also protecting adjacent and nearby existing and future non-industrial uses.
>
> IG (Industrial, general) - This district covers light manufacturing, processing, storage and warehousing, wholesaling, and distribution.

Punta Gorda applies the same industrial performance standards as Charlotte County to non-residential uses. City policies are identical to Charlotte County policies and are administered by a joint City/County Planning Council. The larger-scale facilities, when mentioned in zoning regulations, are prohibited.

In Lee County, there are also two industrial zones. They are

listed below:

IL (Light industrial) - This district is suitable for certain types of light manufacture, processing or fabrication of non-objectionable products not involving the use of materials, processes, or machinery likely to cause undesirable effects upon nearby or adjacent residential or commercial uses.

IG (General industrial) - This district provides areas where various heavy extensive industrial operations can be conducted without creating hazards or other undesirable effects upon surrounding land uses.

Two industrial districts are used in Fort Myers. They are as follows:

Ind-1 (Industrial district 1) - Uses in this district are generally limited to the assembly, packaging or processing of previously prepared goods and materials, retail and wholesale activities requiring extensive storage or warehousing, the receiving, sorting, processing, storage, packing, bottling, and distribution of foods and beverages, and related commercial and service activities.

Ind-2 (Industrial district 2) - This district would cover general manufacturing or processing of raw materials and goods and the conduct of business or storage of materials, products, and equipment outside of buildings without being enclosed with fences or walls.

Most City policies are quite general and encourage the growth of tourism in the City. Such policies would appear to run counter to large-scale industrial development. Most industrially-zoned lands in Fort Myers are located away from the riverfront on the City's east side.

4. Local Government Responses

Due to the location of the generating plant and the source of the fuel supply, the use of rail transport for either oil or coal will affect at least four local governments in Southwest Florida. They would be Charlotte county, Punta Gorda, Lee County, and Fort Myers.

Local governments have limited control over railroad operations. In those cases where actual regulatory control does not exist, local officials may be forced to utilize political pressure, public outcry, or some similar mechanism of "friendly persuasion." The success of such efforts will depend to a great extent on the responsiveness of the railroad administration. That responsiveness is itself dependent on several factors. Among these are railroad company policy, legal and contractural obligations and commitments, economic conditions, and requirements and conditions imposed by state and federal

regulatory agencies.

An example of the successful resolution of a conflict between a railroad and local residents occurred in the Sarasota area. The Seaboard System Railroad changed some of its operational schedule in March, 1983. That change resulted in trains being operated at night. According to a railroad official, the decision led to numerous complaints by people who were being awakened by the passage of the train and its horn. At each street crossing, the train was required by state and federal laws to blow its horn. Railroad officials recognized the problems that caused for sleeping residents, but felt that they could not discontinue the practice due to legal and safety considerations.

The pressure of telephone calls, letters, and a petition from Sarasota residents, however, led to a change in operations. The trains that were operating at night were rescheduled for daylight hours. Train horns still sound at each street crossing as required by law but residents are not awakened.(5)

Other types of response mechanisms available for local governments would be local zoning regulations and codes and ordinances. As stated above, a major assumption of this study is that, even if there is increased rail traffic due to the transport of coal or oil, that will not result in the construction of new lines or other activities in other than existing rights-of-way.

If this assumption is correct, the potential problems for local governments and residents are considerably reduced when compared to the alternative. (That would be the case in which entirely new lines in new rights-of-way would be required.) Under this assumption, the points of conflict will not be much increased over those that currently exist. No new parcels will be bordered by the railroad. Individuals who live or work there and firms doing business there will, however, likely experience increased impacts due to increased rail traffic.

Thus, for the local government with jurisdiction over the area, there will generally be no need to address the impacts of railroad traffic on previously unaffected parcels because there will likely not be any significant increase in the impact area. In reality, individual property owners, residents, and firms occupying those affected parcels will bear the brunt of increased impacts.

Some types of impacts, however, will require local government attention. Those are the issues of delays for highway users, safety, community barriers, and environmental degradation. the first three of these are, at least to some degree, traffic-related. For a municipality faced with the prospect of a significant increase in rail traffic and resulting impacts on city street traffic, there should be a careful examination of the potential problems. A number of possible solutions are available. Among these are the following:

a. traffic control,
b. physical alteration of the conflict site,
c. use of alternate traffic routes, and
d. construction of new traffic routes.

The applicability of these solutions would depend on the type of impact, the severity of the impact, the extent of the impact, the availability of funding, and the perception of the problem by both local officials and residents.

As discussed above, unit trains could have significant impacts on the street traffic. The impacts of unit trains as long as a mile would likely be felt most in the more urban areas along the train route in Punta Gorda and Fort Myers. In addition to the four solutions suggested above, those impacts could be reduced if the trains were to move through those areas as quickly as possible and if train passage were to occur at times of minimum street traffic.

Train speeds, of course, must not exceed those suitable for safe operation in an urban area. Additionally, the physical conditions of the railroad track and other equipment would limit speeds.

The scheduling of train movements may be very difficult to arrange. The passage of the train through a single community will be a relatively minor event when compared with the entire unit train operation. The smoothness and success of that operation would be affected by such factors as the source of the coal supply, the availability of railroad equipment, coal demand in other areas, and railroad traffic. If the coal is transported from a source outside Florida, the complexity of the operation will increase. Therefore, a relatively simple change in scheduling may be very difficult to achieve.

More than likely, none of the four affected local governments would have to make any modifications or additions to the comprehensive plans, rules, regulations, codes, or other ordinances currently in force. The potential impacts that have been discussed in this report can probably be addressed quite adequately by those existing mechanisms.

References for Part VI

(1) Florida Department of Natural Resources, Charlotte Harbor Aquatic Preserves Management Plan , 18 May, p. iii.

(2) Ibid., p. 1.

(3) Ibid., p. 5.

(4) Ibid., pp. 17-20.

(5) Deborah Zara, "Trains Back on the Right Track with Return of Daytime Runs," Sarasota (Florida) Herald-Tribune , 15 August 1983, p. 5-B.

VII. Conclusions

The conversion of an oil-burning electrical generating plant to coal would produce a variety of impacts, both on-site and off-site. Those impacts would generally involve three phases. They would be coal mining, transportation, and burning. Each phase would have sub-phases, depending upon the particular situation. For example, burning coal would involve environmental impacts such as air pollution and solid waste disposal.

This project has examined coal transportation in Southwest Florida. Of all aspects of coal conversion, transportation appears to be the one with the fewest negative impacts. Many of those impacts will not occur in Southwest Florida. In each transportation alternative, similar impacts occur all along the route between the point of fuel production (coal mining) and the point of fuel use. The major exception could occur in the use of trucks, mainly due to the number needed. If trucks were used in the numbers estimated above, their impacts could be significant and highly visible.

The use of a pipeline could also be an exception. The impacts likely to occur along the pipeline route in normal operation would be quite different and much less severe than those that would occur at the termination of the pipeline. The major difference would be the disposal of the water used in the pipeline.

The impacts associated with the use of barges appear to be less harmful than those of other alternatives. Additionally, the barges could be used in numbers comparable to those that apply currently.

The physical differences between coal and oil make coal generally a less harmful fuel for the environment of Southwest Florida. (These statements apply <u>only</u> to the transportation of coal. They do not apply to its burning. They also do not apply to any type of coal slurry.) Coal is a solid. Consequently, it would be far easier to confine it in case of an accident than it would be to confine oil.

Coal would not be easily transported by wind, waves, or current. It would not be washed among mangroves and along and onto other sensitive environments in the same manner as would oil. Coal dust, of course, could be carried about easily.

Spilled coal could be more easily collected than spilled oil. If coal were spilled due to a barge accident, dredging might be required to remove it. More coal could be recovered, with no worse (and probably less) impact on benthic organisms, than if a similar quantity of oil were spilled.

Coal storage would have different impacts than oil storage. Oil is stored in weather-proof tanks. Coal, however, is

usually piled on the ground. As a result of this or similar open storage, coal pile runoff would be a potential problem. Provisions would have to be made to prevent this runoff from escaping, leaching into the ground, and polluting local water resources.

Windblown coal dust could be controlled by washing and wetting. The washing would likely occur early in the overall process before the coal would be transported from the point of supply. Wetting could be used at later points, as during handling and storage at the point of use.

This study has addressed the transportation impacts of the coal conversion of one unit of the FPL plant at Fort Myers. Some general statements can be made, however, about a much broader issue. That would be the development of a new generating facility at the existing site.

As time passes, the units in use at the Fort Myers plant grow older and less capable of meeting anti-pollution standards. These units are also less efficient than newer ones. At some point, replacement will have to be considered. Additionally, this is a growing area and electrical consumption is expected to continue to increase as population increases.

FPL currently has eighty-eight generating units in Florida. (This includes all units in use. For example, there are two fossil stream generators and twelve combustion turbines at the Fort Myers plant. Therefore, that plant is counted as having fourteen units.) Of these eighty-eight units, the one that has been in service the longest began operation in 1946. The next oldest unit went into service in 1953. The range of in-service dates is as follows: 1940's-1, 1950's-7, 1960's-21, 1970's-57, and 1980's-2.

The generating units currently in use at the Fort Myers plant range in age from twenty-five years to ten years. Unit number one was placed in service in December, 1958. Unit number two began service in July, 1960. The twelve combustion turbines were first operational in June, 1974.(1) Thus, Fort Myers unit number one (1958) is one of the eight oldest in the FPL system while unit number two (1969) is among the oldest third.

The age of these units means that the prospect of the retirement of one or more must be considered. Even with a theoretical operational lifetime of forty years, unit number one could need replacement by 1998. (The expected retirement years for these units are listed as "unknown" by FPL in its Ten Year Power Plant Site Plan: 1983-1992 .)

Electrical consumption will continue to grow in the Region. Therefore, provisions must be made to meet the expected demand. This can be done in several ways. The existing facility can operate at maximum capacity as long as possible. Excess electricity generated by other, existing plants can be supplied

to this Region. New units and/or plants can be constructed, either in this Region or elsewhere.

An option to be considered is the use of the Fort Myers site for construction of new (coal-fired) generating units as needed. The existing units could continue to generate power while the new units were being constructed. The access to the Caloosahatchee River and the barge facility at the plant could facilitate the movement of machinery, equipment, and supplies to be used for such a project.

As noted above, the FPL plant at Fort Myers is 460 acres in area with 365.5 acres of the site in use.(2) That leaves about 104 acres not in use. Thus, not only does the site have good transportation access, it also has land available for expansion.

A new unit of greater efficiency and probably larger size could be constructed with the latest technology. It would be centrally located in a region that appears to have a steadily growing appetite for electricity. To make use of the existing site would generate fewer problems and objections than would the development of a new site. To find another site for a power plant in this or any other Region that would satisfy all parties may be impossible.

The water route could continue to be used without cost to FPL and almost without fear of congestion. As discussed above in this report, the impact of the FPL barge traffic is relatively minor. This is primarily a result of the virtual lack of other industrial waterborne traffic on the Caloosahatchee River. Also, the likely replacement of the Edison Bridge will eliminate problems caused by opening that bridge to permit the barges to pass.

If railroad transportation were to be considered, some long range planning would have to be applied. One problem that must be addressed is the abandonment of rail routes in Southwest Florida. Once the right-of-way is sold, the land is usually converted to other uses. For example, rights-of-way may be used for other transportation purposes such as streets. It is possible, of course, that the right-of-way will not have been converted to another use after its sale by the railroad. Even so, it will have to be repurchased from the current owner(s). That will require additional effort, time, and expense.

It may be that new rights-of-way over different routes would have to be developed. If that were necessary, the potential time, costs (financial, environmental, and other), and difficulty may make the development of new rights-of-way unfeasible. In any case, the continued abandonment of railroad rights-of-way may have negative repercussions if railroad transportation of fuel is to be used in the future.

Overall, expanded use of the existing generating site appears

to be less costly than the development of a new site. Due to the likely costs involved in the development and operation of any generating facility, however, no new facility should be constructed until all reasonable alternatives have been examined.

References for Part VII

(1) Florida Power & Light Company, Ten Year Power Plant Site Plan: 1983-1992 , 1 April, 1983, pp. 28-30.

(2) Ibid., p. 31.

VIII. Recommendations

The results of the conversion of the FPL electrical generating plant at Fort Myers to burn coal likely could be adequately dealt with via existing regulatory mechanisms. All levels of government--local, regional, state, and federal--should, however, be aware of the potential changes (such as discussed here) that could occur.

Local governments should be especially careful to review any likely changes that might affect sensitive areas and issues. For example, dredging impacts on water, railroad impacts on traffic, and pipeline impacts on wetlands are three general groups of impacts. Each transportation alternative has several groups of impacts such as these. Each group has numerous sub-groups of specific impacts (as discussed above in this report).

No new policies are recommended for adoption by the Southwest Florida Regional Planning Council. Existing Council policies and positions should be adequate to address the potential impacts discussed above. Even if impacts of a greater magnitude were to occur, the Council occupies a unique position in its capacity to focus local and state concerns on problems of a regional nature. That regional perspective will, in turn, permit the development of responses that efficiently incorporate both local and state government concerns.

IX. Council Action

The draft version of this report was first presented to the Southwest Florida Regional Plannng Council on June 21, 1984. Council authorized staff to distribute the draft for review and comment and to advertise for two hearings to receive public comment. Information about the report was distributed to area news media, the SWFRPC Citizens' Advisory Committee, local governments in the Region, area libraries, and state agencies. The two hearings were held as part of the Council meetings of July 19 and September 20.

On October 18, 1984, the Council addressed this project for the third time. At that meeting, Council unanimously accepted this report and authorized its distribution.

APPENDIX A

Coal Conversion Feasibility Study

The U.S. Department of Energy conducted a feasibility study of the conversion of fourteen Florida generating stations from burning oil to coal. (Conversion of Florida Electric Powerplants from Oil to Coal Burning: Engineering, Environmental, and Economic Feasibility Study of 14 Florida Generating Stations .) The study focused on fourteen generating stations throughout Florida, one of which was unit number two of the Florida Power and Light Company plant at Fort Myers. (See Figure A-1.) Three specific areas of feasibility (engineering, environment, and economics) were examined. Each was reviewed separately. Then, a composite ranking was developed for the stations under study. (The reader should note that reference to a generating plant does not necessarily include all generating units. For the Fort Myers plant, for example, it includes only unit number two.)

The examination of engineering feasibility included five areas: boiler design and derating, space considerations, boiler size and year placed in service, coal transportation and unloading facilities, and costs and other considerations.

The first category, boiler design and derating, was the most heavily weighted of the five engineering factors. This reflected the fact that design factors could not be readily or easily altered and would have significant impacts on if and how well coal could be burned. Derating referred to any loss in boiler efficiency that might occur if the generating unit were converted to coal. Decreased efficiency was assumed to mean decreased feasibility.

The space available at the site was reviewed. Coal conversion would require adequate space for receiving and storing coal, equipment location, ash storage and disposal, and pollution equipment. In some cases, the utility company already possessed adequate excess land. Where that was not true, additional land would have to be purchased from adjacent property owners. That expense would increase the cost of conversion. (While it is also possible that sufficient land might not be located adjacent to or convenient to the conversion site, that was considered to be unlikely.)

The size and age of the boiler were also considered. It was assumed generally to be more feasible to convert a larger unit than a smaller unit due to the higher efficiency of larger units. Newer boilers were thought to be better suited to conversion than older ones due to the longer expected service life.

Coal transportation and unloading facilities were of obvious importance. A unit with such facilities for coal would have an advantage over one without those facilities. Even if expansion were required to handle larger quantities of coal, this would probably be easier than to construct entirely new facilities.

The last engineering category, other considerations and costs, included a variety of items. For each generating unit, an estimate

was developed of the cost in dollars per kilowatt to convert to burn coal. The need for additional pollution control equipment (e.g., for sulfur dioxide) was examined. Also, burning coal could result in a requirement for new or taller stacks to disperse emissions and handle greater flue gas volumes. That potential cost was included if deemed necessary.

Points were assigned to each of the fourteen stations for each of these engineering categories. (See Table A-1.) The Fort Myers unit was rated as a good candidate for coal conversion, based on this engineering analysis.(1) (The specific ratings for that unit are presented in Table A-2.)

In addition to the engineering analysis, an environmental analysis was performed. That analysis included air quality, water quality (groundwater and surface water), solid waste, land use, biotic resources, historical, cultural and archaeological resources, and socioeconomics. Information for each category was developed on a worst-case basis to determine maximum environmental impacts. Using that information, each site was then ranked by environmental experts from various disciplines. (The environmental analysis dealt only with the generating unit area, i.e., the site of the conversion. It did not address environmental impacts either at the point of coal production or at points along the transportation route.)

The air quality category was concerned with particulates, sulfur dioxide, and oxides of nitrogen. These were addressed both for short-term emissions and annual emissions.

Water quality impacts were examined for both surface water and groundwater. Specific issues included ash sluice water, coal pile runoff, flue gas desulfurization sludge, and coal slurry pipeline effluent.

Solid waste disposal needs were reviewed. Adequate area was thought to be available. This was a general review that did not address a specific site.

Coal conversion impacts on land use were determined to be minimal. This determination again, however, did not focus on specific sites. It was thought to be generally accurate since the total land area of the conversion sites was small in comparison to the total land area of the state.

The biotic resources category focused on threatened or endangered species. No significant impacts to plants or animals in either group were found. Review of historical, cultural, and archaeological resources led to the conclusion that there would be no direct impacts (disruption or destruction) on these resources in the case of conversion. The conclusion that impacts for both of these categories of resources would be insignificant likely was due to the availability of unused land at the conversion site.

Insignificant socioeconomic impacts were projected. Primarily this concerned in-migration due to persons moving into an area to work at

one of the conversion sites.

Overall rankings for environmental impacts were assigned to all fourteen units. (See Table A-3.) The Fort Myers unit was the first of nine units judged to be good candidates from an environmental perspective. Five units were ranked fair. None of the sites received a poor ranking.(2)

The Fort Myers site was listed as having only one site-specific environmental sensitivity in the worst-case situation. This was the problem of groundwater contamination, a problem that was shared by all fourteen sites. (See Table A-4.) For that reason, i.e., the sensitivity of the groundwater, the feasibility study recommended that effluent not be discharged to the groundwater at any of the sites.

The third analysis in the feasibility study examined the economics of coal conversion. Due to the importance of economic feasibility, the information used was more specific for each generating unit than in the other analyses. Among the items included were capital costs, operating and maintenance costs, derating (loss of efficiency, if any, due to conversion), fuel prices, inflation, taxes, rates, necessary engineering changes and their costs, and remaining generating unit life.

The Fort Myers unit was ranked as one of three with poor overall economic potential. (See Table A-5.)(3) The feasibility study indicated two areas in which the site suffered in comparison to the thirteen other sites. First, unlike some sites, only one unit was considered for conversion. This eliminated any economies that might result from the conversion of multiple units at a single site. The ratio of savings to cost (i.e., net return per dollar invested) was lower for the Fort Myers site than for any of the other thirteen sites. Additionally, that unit also had the longest period before savings would begin (the sixth year of operation after conversion). (Of the six other FPL stations studied, four units had four-year periods, one had a three-year period, and only one had a one-year period.)

The second disadvantage for the Fort Myers unit was its geographic location and resulting higher fuel cost for coal.(4) In the analysis, the current oil price (delivered price as of June, 1982) for the Fort Myers unit was among the lowest of the fourteen plants. On the other hand, the estimated coal price was the highest.(5) This seems to be somewhat inconsistent. The factors that result in a low oil cost should have some effect on the coal cost. To state that the Fort Myers unit would have higher coal price because of its geographic location seems almost illogical--considering the low oil cost.

There may be some other costs that should have been included in the fuel price but were not. The Fort Myers plant receives its oil via barge from Port Boca Grande. Oil is tankered into the Port from various sources. (The actual receipt, storage, and transloading of the oil are handled by Belcher Oil Company.) In order for tankers to enter the Port safely, an entrance channel from the Gulf of Mexico through Boca Grande Pass must be redredged approximately once every

two years. The cost of that dredging is substantial. In 1980, it was $741,503. It had cost $995,500 in 1978.(6) (For more discussion, the reader is referred to the main body of this report.)

Florida Power & Light Company (owner of the Fort Myers unit) pays no direct fee or part of that cost. The entire cost is paid for by federal funds, i.e., federal tax payers. Additionally, FPL pays no fee for use of the Intracoastal Waterway and Okeechobee Waterway (Caloosahatchee River). This latter statement is also true for all other users of the Waterways.(7)

There is an additional cost of using Port Boca Grande. That is the cost of maintaining adequate water depths for oil tankers to dock at the facility. The docking area requires regular maintenance dredging. In 1981, FPL requested a maintenance dredging permit from the U.S. Army Corps of Engineers for ten years for the tanker berth at Port Boca Grande. In order to maintain the desired depth of 38 feet below mean low water, it was estimated that the dredging of about 50,000 cubic yards of spoil would be needed once every two years. FPL also sought USACE permission to construct a 300-foot groin at the southwestern tip of Gasparilla Island to contain the spoil, minimize beach erosion, and reduce the frequency of the required maintenance dredging.(8)

The project was completed by October of 1983. Total cost was $625,000. Lee County and the West Coast Inland Navigation District each paid $90,000. FPL paid the remainder, $445,000. The dredged sand was used to make a 75,000-square foot beach around the old Port Boca Grande Lighthouse.(9)(10) (The lighthouse, built in 1890, was placed on the National Register of Historic Places in 1980.)(11)

By May, 1984, however, there were reports of severe erosion in that area. The dredged sand beach on the Gulf side of the groin has generally remained in place. On the other side, however, the area behind the groin has undergone significant erosion. Apparently, that eroded sand has moved into the dredged area around the FPL dock and likely will continue to do so.(12)

As shown here, there are monetary costs involved in using Port Boca Grande that are borne both by the public (via the federal government, Lee County, and the West Coast Inland Navigation District) and by the user (Florida Power and Light). Some of those costs are not so apparent. This is true of the costs borne by the public.

After the engineering, environmental, and economic analyses were completed, each unit was rated as a good, fair, or poor candidate for coal conversion. (See Table A-6.) Five of the units were judged to be good candidates while the remaining nine were found to be fair candidates. Fort Myers was placed in the fair group. None were rated as poor.(13)

References for Appendix A

(1) U.S., Department of Energy, Economic Regulatory Administration, Office of Fuels Programs, Conversion of Florida Electric Powerplants from Oil to Coal Burning: Engineering, Environmental, and Economic Feasibility Study of 14 Florida Generating Stations , April 1983, p. 13.

(2) Ibid., p. 47.

(3) Ibid., p. 71.

(4) Ibid., pp. 67 and 68.

(5) Ibid., p. 54.

(6) Girlamo DiChiara, Department of the Army, Jacksonville District, Corps of Engineers, letter, 26 October, 1983.

(7) Willy Canaday, Department of the Army, Gulf Coast Area Office (Tampa), Jacksonville District, Corps of Engineers, telephone interview, 11 October, 1983.

(8) U.S., Department of the Army, Jacksonville District, Corps of Engineers, Public Notice For Permit Application No. 81K-1259 (applicant: Florida Power and Light Company).

(9) "New Groin Puts 75,000 Square Feet of Beach around Lighthouse," Boca Beacon (Boca Grande, Florida), October, 1983.

(10) The West Coast Inland Navigation District is primarily responsible for the acquisition and maintenance of easements, rights-of-way, and spoil areas for the West Coast Intracoastal Waterway. Under legislation passed by Congress in 1945, the waterway was to have a 9-foot channel, 100-foot width, and 150-mile length from the Caloosahatchee River in Lee County to the Anclote River in Pinellas County. The West Coast Inland Navigation District itself was created by the Florida legislature in 1947. Originally, it covered Lee, Charlotte, Sarasota, Manatee, Hillsborough, and Pinellas Counties. In 1979, the latter two counties withdrew. WCIND is organized as a special tax district with a governing board of one county commissioner from each member county. The 1983 levy on each of the four participating counties was .005 mills. Source: West Coast Inland Navigation District, Guide Map: West Coast Intracoastal Waterway (Fort Myers to Tarpon Springs), 1983.

(11) Julius Karash, "Old Boca Grande Lighthouse in National Historic Register," Fort Myers (Florida) News-Press , 2 April, 1980.

(12) "Groin Accelerates Erosion," Boca Beacon (Boca Grande, Florida), May, 1984.

(13) U.S., Department of Energy, p. 74.

APPENDIX B

A Long Range Perspective

This study focuses on a mode of transportation that is decreasing in importance in Southwest Florida--railroads. A major factor in opening much of Florida to settlement was the laying of railroad track. At one time, railroad transportation was available as far south as Everglades City in Collier County.

Florida had its first cross-state railroad in 1861 when a track was finished between Fernandina (on the east coast in Nassau County) and Cedar Key (on the Gulf Coast in Levy County). This provided an alternative to sailing around the Florida peninsula to reach the Gulf Coast.(1)

A railroad had been built to Orlando by 1880. Tampa had rail service by 1884 (the South Florida Railroad). Trains entered Bartow (Polk County) in 1885. By 1886, the line reached Fort Ogden (south of Arcadia in DeSoto County). A few months later, on July 24, the Florida Southern Railroad got to Punta Gorda. These and other southern extensions were stimulated by tourism and the market for winter fruits and vegetables.(2)

The citizens of Fort Myers had to wait eighteen years, until 1904, for that line (then the Atlantic Coast Line Railroad) to be extended to them.(3) For Naples, the wait was even longer. The Atlantic Coast Line Railroad did not reach the Naples area until 1926. The Seaboard Air Line entered Naples proper in 1927. ACL extended south to Marco Island in June of 1927.(4) Seaboard had reached Fort Myers in 1926 and track was laid to LaBelle and Punta Rassa in 1927.(5)

The Atlantic Coast Line Railroad route in Central Florida continued moving south of Sebring (Highlands County) in the early 1900s. That route arrived in Moore Haven in 1918. Construction of an extension to Clewiston was completed in 1921.(6)

Even after rail service was available, train travel could be slow and tiresome. A trip by train from Jacksonville to Punta Gorda (circa 1887) meant changing railroads five times. To travel from Palatka to Punta Gorda took ten hours at that time.(7) For the Punta Gorda to Fort Myers trip, about two hours were needed (circa 1904).(8) Quail hunts were sometimes held while trains stopped for fuel or water. Both passengers and railroad employees participated.

The Arcadia-Punta Gorda section held other possibilities. Since this part of the trip usually occurred after dark, kerosene lanterns were used by passengers in the train cars. These lights, swinging from the ceiling, were sometimes used for target practice by cowboys along the route. On days when farmhands and cowboys were off work (such as Saturdays), they occasionally took the train from Arcadia to Punta Gorda. Both legs of the trip could be quite boisterous if the passengers celebrated their day off by having a few drinks.(9)

The Charlotte Harbor and Northern Railroad to Boca Grande was

completed in 1907 to transport phosphate ore from Central Florida to Port Boca Grande. Before then, phosphate ore had been barged down the Peace River to Port Boca Grande where it was loaded onto ships for transport elsewhere. That railroad was acquired by the Seaboard Airline Railroad in 1926.(10) In 1967, Seaboard and Atlantic Coast Line Railroad merged to the Seaboard Coastline Railroad.

In addition to the main routes--some of which are still in use today--there were smaller railroads. Those were designed to handle specific operations. Privately owned, they were strictly utilitarian affairs. Some transported wood products to and from lumber mills. others carried fruits and vegetables. They penetrated parts of the Region that other wise could only be reached by foot or on horseback, One example was the Deep Lake Railway in Collier County. That line was built around 1900 by a logging company to transport lumber to Everglades City for shipment elsewhere. The tracks ran from Deep Lake, through Jerome and Copeland, to Everglades City, along what is now State Route 29.(11)

The routes of those little lines are lost except in the memories of older long-time residents and on some maps that show old railroad grades. In most cases, the passage of time, the growth of trees and vegetation, and changes due to development have eliminated the remains.(12)

Currently, the railroad enters Southwest Florida via three routes. The northernmost route passes into Sarasota County parallel to U.S. 301. A second route follows U.S. 17 from Arcadia in DeSoto County to Punta Gorda in Charlotte County. From there it proceeds through Fort Myers to terminate east of U.S. 41 in Collier County south of the Lee-Collier line. The third route goes into Glades County with U.S. 27 and east through Moore Haven. From there it goes on to Clewiston in Hendry County.

As noted above, the railroad that passes through Fort Myers once extended into Naples and Marco Island. The Naples to Marco Island portion was discontinued in 1944. Passenger service to Naples ended in 1971. In May of 1980, after almost sixty years of service into Naples, Seaboard ended all service and cut that route back to Vanderbilt Beach (Collier County), just south of the Lee County-Collier County line.(13)

The northernmost railroad enters the Region in Sarasota County and runs south to Venice. There are no known plans for abandonment of that track.

The third route (Moore Haven and Clewiston) formerly branched south at Palmdale (in Glades County near the intersection of State road 29 and U.S. 27). From there it ran through Immokalee and on to Everglades City. Passenger service to Everglades City ended in 1959. All service ended when the line was pulled back to Immokalee in the 1960s.(14) Seaboard Coast Line was granted permission by the Interstate Commerce Commission to abandon that remaining portion of the branch in January of 1984.(15)

Seaboard Coast Line ended service to Port Boca Grande in 1979.(16) According to Seaboard, the track and the equipment at Boca Grande and along the route were old and in need of significant repair. It also claimed that the expense of repair was not justified because more modern, efficient equipment was available in Tampa area.(17)

The overall picture of rail service in Southwest Florida is not encouraging. The posture of the railroad seems to be one of retrenchment. That may be reasonable from the perspective of a large corporation with holdings in much of the eastern United States. It is not as reasonable, however, from the perspective of the Region. There is, of course, the short-term immediate impact of forcing former railroad users to seek other means of transporting goods. Some will adapt their operations, although at a cost. Others will not be able to do so and will cease operation. Some will move. All of those actions will have economic impacts on this Region and those impacts will generally be negative.

There is a long-term impact also. Those firms that close or move out of the Region obviously will not contribute to the overall economy of Southwest Florida. Other firms will also be affected Existing firms that wish to expand and to use rail transport to ship or receive goods will not be able to do so. Firms that require rail transport will not locate here.

This Region will likely continue to grow and develop. As it does, the need for rail transport will also grow. If the reduction in rail service continues, that need will be unmet.

References for Appendix B

(1) Edward A. Fernald, ed., Atlas of Florida (Tallahassee, Florida: The Florida State University Foundation, Inc., 1981), p. 135.

(2) Vernon E. Peeples, "Charlotte Harbor Division of the Florida Southern Railroad," Florida Historical Quarterly (January, 1980): 291-292.

(3) Karl H. Grismer, The Story of Fort Myers: The History of the Land of the Caloosahatchee and Southwest Florida , a facsimile reproduction of the 1949 edition, with a Foreword by Ernest W. Hall (Fort Myers Beach, Florida; Island Press Publishers, 1982), pp. 164 and 166.

(4) James Moses, "'Iron Horse' Linked Us to the North," Naples (Florida) Daily News , 1 March, 1984, p. 3E.

(5) Karl H. Grismer, pp. 232 and 234.

(6) Southwest Florida Regional Planning Council The Glades County Comprehensive Plan , July, 1981, p. 4.

(7) Vernon E. Peeples, pp. 297-298.

(8) Karl H. Grismer, p. 166.

(9) Vernon E. Peeples, p. 297.

(10) Lee County (Florida) Division of Community Development, Port Boca Grande: A Basic Study , June, 1980, p. 2.

(11) James Moses.

(12) The reader is referred to articles such as "Railroading on the Gulf Coast; A conversation with E.A. 'Frog' Smith," Tampa Bay History 2 (Fall/Winter 1980): 41-60.

(13) James Moses.

(14) Ibid.

(15) Interstate Commerce Commission, Certificate and Decision, Docket No. AB-55 (Sub-no. 88) Seaboard System Railroad, Inc--Abandonment-in Collier, Glades, and Hendry Counties, Florida, 13 December 1983.

(16) Lee County Division of Community Development, p. 8.

(17) Ibid., p. 4.

APPENDIX C

Glossary

acre-foot--the quantity of water that would cover one acre to a depth of one foot. It contains 43,560 cubic feet, 1,233 cubic meters, or 32,580 gallons.

aerobic--refers to life or processes that can occur only in the presence of oxygen.

anaerobic--refers to life or processes that occur in the absence of oxygen.

anthracite--a hard black lustrous coal that burns efficiently, containing a high percentage of carbon and a low percentage of volatile matter.

aquifer--an underground bed or stratum of earth, gravel, or porous stone that contains water.

biochemical oxygen demand (BOD)--a measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. Large amounts of organic waste use up large amounts of dissolved oxygen. The greater the degree of pollution, the greater the BOD.

bituminous-coal--a coal which is high in carbonaceous matter, having between 15 and 50 percent volatile matter. Soft coal that is dark brown to black in color and burns with a smoky, luminous flame.

British thermal unit (Btu)--the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit under stated conditions of pressure and temperature; equal to 252 calories.

bunker C fuel oil-- heavy residual fuel oil used by ships, industry, and large-scale heating installations; often referred to as "No. 6 fuel oil."

coal slurry--finely crushed coal mixed with water (or oil) to form a fluid.

dewatering--a process whereby water is removed from a slurry.

fossil fuel--any naturally occurring fuel of an organic nature, such as coal, oil, and natural gas.

gondola car--a railway car with no top, designed for bulky materials.

heat rate--a measure of generating station thermal efficiency, generally expressed in Btu per net kilowatt-hour. It is computed by dividing the total Btu content of fuel burned

for electric generation by the resulting net kilowatt-hour generation.

hopper car--a railway car for coal, gravel, etc., shaped like an inverted pyramid or cone (or series of such) with an opening to discharge the contents.

mine-mouth generation--generation of electrical energy based on the premise that it is cheaper to ship electricity than coal.

particulates--solid particles, such as ash, which are released from the combustion process in exhaust gases at fossil fuel plants.

unit train--a combination of locomotives and coal cars (generally 100 cars, each with a capacity of 100 tons) used to transport car. Moving from coal supply to power plant and back, the unit train may travel long distances, stopping only for servicing and crew changes. Even the loading and unloading may be done without stopping.

References for Appendix C

Most of these entries are taken from the following source:

Thomas F.P. Sullivan, ed., Energy Reference Handbook , 2d ed. (Washington: Government Institutes, Inc., 1977).

APPENDIX D

Land Use Terminology

Agriculture - Land uses such as crops, improved pasture, ranch land, groves, etc.

Residential - Residential land uses are separated into two categories; single-family and multiple-family. The single-family category includes dwelling units that are not physically connected to other units. These units include the typical suburban home and the mobile home. The multiple-family classification includes units which touch other dwelling units, such as duplexes and apartments.

Commercial - Those uses related to retail and wholesale distribution of goods and services, including associated warehousing, shopping centers, office complexes and highway "strip" commercial development.

Industrial - Industrial land uses include uses related to fabrication, processing and manufacturing, as well as associated warehousing. Typical examples in the Region include lumber yards and concrete and cement plants.

Institutional - Institutional land uses include those public and semi-public uses such as schools, governmental centers, correctional facilities, hospitals and religious facilities.

Extractive - Those mining operations that are currently underway or have ended without land restoration. Examples of extractive uses include shell pits, quarries, mines, oil and gas wells, and borrow pits for landfill.

Transportation, Communications, Utilities - Those operations such as airports, ports, wellfields, transmission lines, large sewage treatment plants, power plants, etc.

Mixed - This use refers to combinations of the land uses above in which no one use constitutes 70% of the land coverage of a 20-acre parcel.

Open and other - This primarily refers to lands prepared for urban development but not yet occupied. Other uses include parks, golf courses, government-owned preserves, etc.

SOURCE: Based upon the Florida Land Use and Cover Classification System.

APPENDIX E

Literature Review

A careful review of all relevant reports, studies, and other documents in the library and files of the Southwest Florida Regional Planning Council was conducted in the early stages of this project. Relatively few materials were found to be specifically directed at the topic of coal transportation. Council staff contacted other agencies. Personnel in those agencies, as well as individuals in private companies, were very helpful in locating useful material. As the project has progressed, additional information has been collected. This has included reports done by other agencies in Florida, agencies and organizations in other states, and federal agencies.

Through this process, Council staff have increased their knowledge of the topic. That material has been added to the Council library as a permanent resource. Most importantly, that information has been applied to an issue of potential impact for Southwest Florida, coal transportation, and has been used to produce a report with information relevant to the needs and concerns of the Region. (All of the sources used for this project are listed in this document.)

Appendix F
Tables

TABLE 1

Florida Power and Light Company,
Fort Myers Plant

Unit Number	1	2	1-12
Type	Fossil Steam	Fossil Steam	Combustion Turbine
Fuel	Heavy Oil	Heavy Oil	Light Oil
Commercial In-service Date	12-58	7-69	6-74
Generating Maximum	156,250 kw	402,050 kw	744,000 kw
Flue gas cleaning			
particulates	CSCF	MC	--
sulfur oxide (SO_x)	CSCF	CSCF	--
nitrogen oxides (NO_x)	NS	NS	--
Cooling Type	OTS	OTS	--

kw: kilowatt.
CSCF: controlled sulfur content of fuel.
MC: mechanical collectors.
NS: no state or federal NO_x emission or ambient standards for existing electric generating facilities.
OTS: once through saline.

Source: Adapted from FPL Ten-Year Power Plant Site Plan: 1983-1992, pp. 30-33.

TABLE 2

LAND USE
IN SOUTHWEST FLORIDA (1980)

Category*	Acres	Percent Urban	Percent Of Total Land Use
Total Lands	3,853,440		100.0
Agricultural Lands	1,638,750		42.5
Urban Lands	477,140	100.00	12.4
Residential			
Single-Family	140,579	29.5	
Multiple-Family	5,900	1.2	
Commercial	10,216	2.1	
Industrial	3,153	0.7	
Institutional	4,894	1.0	
Extractive	7,383	1.5	
Transportation, Communications & Utilities (Less Transportation Routes)	11,048	2.3	
Mixed	2,210	0.5	
Open and Other	291,757	61.2	
Major Preserved Open Space	824,349		21.4
Other and Vacant	913,201		23.7

* These categories are defined in the appendix.

SOURCE: The Southwest Florida Economy - 1982, p. 3.

TABLE 3

FREIGHT TRAFFIC (Short Tons)
BOCA GRANDE, FLORIDA

Commodity	1970	1971	1972	1974	1975	1979
Phosphate Rock	1,125,843	827,185	517,796	511,625	85,967	136,252
Chemical Fertilizers						
Nitrogenous	2,180	9,117	--	--	--	--
Phosphatic	124,914	190,891	178,763	266,479	102,670	48,539
Potassic	--	--	5,200	--	1,198	--
Other	123,241	162,076	210,224	273,841	196,333	57,634
Petroleum Products						
Residual Fuel Oil	1,148,485	1,150,575	1,386,800	1,278,256	1,379,708	1,423,800
Lubricants	40,509	35,448	--	--	--	--
Asphalt, Tar Pitch	20,976	--	--	--	--	--
Distillate Fuel Oil	--	18,081	--	331,467	489,746	36,189
Jet Fuel	--	8,244	--	--	--	--
Gasoline	--	--	--	36,549	--	--
TOTALS	2,586,148	2,401,617	2,298,783	2,698,217	2,255,622	1,702,414

SOURCE: U.S. Army Corps of Engineers, Jacksonville District, Waterborne Commerce of the United States, 1970-79.

TABLE 4

BRIDGES ON FEDERALLY MAINTAINED WATERWAYS, SOUTHWEST FLORIDA

NAME/LOCATION	TYPE	HORIZONTAL CLEARANCE	VERTICAL CLEARANCE AT CENTER
Ringling Causeway Bridge A	bascule	89 feet	22 feet
Bay Island at northern entrance to Roberts Bay	bascule	90 feet	25 feet
Siesta Key at Stickney Point	bascule	90 feet	23 feet
Casey Key at Blackburn Point Road	swing	51 feet (east draw)	9 feet
Casey Key at Albee Road to Nokomis Beach	bascule	90 feet	14 feet
Venice at US 41	bascule	90 feet	16 feet
Venice at Venice Avenue	bascule	90 feet	30 feet
Venice at Tamiami Trail near Venice Airport	bascule	90 feet	25 feet
Manasota Key at Manasota Beach Road	bascule	90 feet	26 feet
Lemon Bay at Redfish Cove and State Hwy. 776	bascule	86 feet	26 feet
Placida at State Hwy. 771 to Boca Grande	swing	81 feet	9 feet
Placida at Seaboard Coast Line Railroad*	bascule	90 feet	55 feet open 55 feet closed
Cape Coral Bridge	fixed	90 feet	56 feet
Caloosahatchee Bridge	fixed	105 feet	55 feet
Edison Memorial Bridge	bascule	78 feet	9 feet
Railroad bridge at Beautiful Island-Caloosahatchee	bascule	100 feet	5 feet
I-75	fixed	107 feet	55 feet

*Maintained in the open position.

SOURCE: Nautical Chart 11425, Intracoastal Waterway, Charlotte Harbor to Tampa Bay (21st edition, July 10, 1982) and Nautical Chart 11427, Intracoastal-Okeechobee Waterways, Fort Myers to Charlotte Harbor and Wiggins Pass (20th edition, August 14, 1982).

TABLE 5

COMMERCIAL STATISTICS

	Total Trips*	Total Tons
1980		
Okeechobee Waterway	11,086	972,424
New Pass	400	25
Caseys Pass	No statistics	--
Charlotte Harbor	11,524	1,353,114
Ft. Myers Beach	11,550	31,072
Naples Harbor	No statistics	--
Everglades Harbor	5,870	1,042
Intracoastal Waterway, Caloosahatchee River-Anclote River	46,573	1,215,318
1981		
Okeechobee Waterway	3,717	933,999
New Pass	None	None
Caseys Pass	None	None
Charlotte Harbor	14,477	1,170,351
Ft. Myers Beach	11,770	36,673
Naples Harbor	None	None
Everglades Harbor	2,400	1,032
Intracoastal Waterway, Caloosahatchee River-Anclote River	85,131	1,328,030

*Includes inbound/outbound trips and trips both up and down the waterway, i.e., east/west or north/south as the case may be.

SOURCE: U.S. Army Corps of Engineers, personal communication, 26 October, 1983.

TABLE 6

AIR TRAFFIC, 1970-1983

	Passengers[1]	Flight Operations[2]	Air Cargo (pounds)
Page Field[3]			
1970	N/A	113,453	1,007,760
1971	170,878	100,763	883,140
1972	216,601	95,295	1,115,600
1973	272,981	91,681	1,006,000
1974	N/A	95,163	N/A
1975	278,228	95,288	522,118
1976	454,666	104,355	278,517
1977	543,164	109,694	N/A
1978	676,146	127,676	2,949,472
1979	821,887	141,096	3,136,036
1980	1,129,056	139,075	3,642,477
1981	1,108,133	136,319	3,859,289
1982	1,168,475	139,165	3,192,216
1983[3]	1,258,304	147,458	3,640,959
Sarasota-Bradenton Airport			
1970	287,834	132,100	2,095,421[4]
1971	389,325	126,768	2,476,584
1972	471,837	118,995	3,079,324
1973	535,794	123,474	3,605,450
1974	570,125	139,983	3,438,837
1975	585,498	133,595	2,824,850
1976	683,137	142,484	2,858,224
1977	785,463	153,767	2,653,344
1978	905,278	159,495	2,478,170
1979	1,089,737	162,237	3,220,760
1980	1,215,975	144,604	3,028,637
1981	1,066,541	142,665	2,711,241
1982	1,408,118	159,513	2,403,563
1983	1,471,454	158,295	2,989,477

[1] Includes enplanements and deplanements.
[2] Includes landings and take-offs.
[3] Southwest Florida Regional Airport opened in May of 1983.
[4] On-loading only.

Source: Information provided by airport personnel.

TABLE 7

Fuel for Net Electrical Generation, Florida, 1965-1981[1]

		1965	1970	1975	1980	1981
Natural Gas	GWH[2]	7,556	17,954	12,586	14,859	15,829
	bcf[3]	87.0	198.3	141.3	166.1	171.5
	%	25.0	32.4	16.2	15.5	15.9
Coal	GWH	5,339	11,394	12,592	19,739	21,874
	1,000 short tons	2,323	5,145	5,764	8,785	9,763
	%	17.8	20.5	16.2	20.6	21.9
Fuel Oil	GWH	17,019	25,829	44,045	44,354	47,446
	1,000 bbls[4]	28,060	44,557	73,892	73,194	77,115
	%	56.2	46.6	56.6	46.2	47.6
Hydroelec-tric	GWH	298	292	232	215	180
	--	--	--	--	--	--
	%	1.0	0.5	0.3	0.2	0.2
Nuclear	GWH	0	0	8,370	16,737	14,448
	kg[5]	0	0	1,218	80	0
	%	0	0	10.8	17.5	14.5
Total	GWH	30,272	55,469	77,825	95,904	99,777
	%	100.0	100.0	100.1	100.0	100.1

[1]Net electrical generation equals gross generation less electricity consumed out of gross generation for station use.

[2]GWH: gigawatt-hours or millions of kilowatt-hours.

[3]bcf: billion cubic feet.

[4]The major portion of fuel oil burned is residual oil, while the rest is distillate oil. The break-down in 1,000 barrels is as follows:

	1965	1970	1975	1980	1981
residual	27,685	43,895	68,621	69,994	74,857
distillate	375	662	5,271	3,200	2,258

[5]kg: kilograms of U-235.

SOURCE: Adapted from Florida Statistical Abstract; data for 1965, 1970, and 1975 from 1981 volume, pages 390 and 395; data for 1980 and 1981 from 1983 volume, page 417.

Table 8

Fuel for Electrical Generation, U.S.

	Petroleum		Natural Gas		Coal	
	1,000 Barrels	% Change	Billion Cubic Feet	% Change	1,000 Short Tons	% Change
1960	92,000	--	1,725	--	177,000	--
1965	121,000	+31.5	2,321	+34.6	245,000	+38.4
1970	340,000	+181.0	3,932	+69.4	320,000	+30.6
1975	519,000	+52.7	3,158	-19.7	406,000	+26.9
1980	425,000	-18.1	3,682	+16.6	569,000	+40.2

SOURCE: Statistical Abstract of the United States: 1982-83, p. 725.

Table 9

Estimated Coal Usage, Electricity Generation, Florida

	Tons	Change
1982	10,930,000	--
1990[1]	25,278,000	131%
1990[2]	35,850,000	228%

[1] Based on existing and planned generating plants only.

[2] Includes both existing and planned plants and all potential conversion candidates.

Source: U.S. Department of Energy, The Florida Statewide Coal Conversion Study; Coal Supply and Transportation Analysis, September, 1983, pp. 3-5 and 3-7.

Table 10

Annual Fuel Transportation Requirements,[1] Unit Number 2

Fuel Type	Year 1982	Year 1990[2]
Heavy Oil[3]	420 barges[4]	------ barges
	4,959 tank cars	------ tank cars
	17,192 tanker trucks	------ tanker trucks
Coal[5]	536-804 barges	274-410 barges
	8,043 hopper cars	4,100 hopper cars
	30,934 trucks	15,769 trucks

[1]These are estimates of the number of loads or trips likely to be required, depending on the type of vehicle or craft used. They were calculated on the following capacities:

Vehicle/craft	Oil	Coal
barge	11,000 gallons	1,000-1,500 tons
tank car	26,000 gallons	----
tank truck	7,500 gallons	----
hopper car	-------	100 tons
truck	-------	26 tons

[2]1990 coal numbers are calculated on the assumption that unit number 2 will operate at a lower capacity factor than if coal conversion does not occur. A further explanation is given in the text.

[3]3,070,003 barrels (128,940,126 gallons) of heavy oil were used by unit number 2 in 1982. The total amount of heavy oil burned at the generating plant was 4,536,111 barrels. The total amount delivered to the plant was 4,610,964 barrels. Due to the small difference between the amount received and the amount burned, it is assumed that any fuel, coal or oil, received will be burned in the same year. It is recognized that small quantities may remain in storage at the plant.

[4]100 shipments of one barge each and 160 shipments of two barges each. Calculated from information provided by Frank Balogh of FPL.

[5]All coal numbers for 1982 are computed on the basis of transporting an amount of coal equivalent to the amount of heavy oil actually used in 1982 by unit number 2. A coal equivalent of 804,263 tons was calculated for 1982: 128,940,126 gallons of oil at 149,700 BTU/gallon; each ton of coal was assumed to have 24,000,000 BTUs.

TABLE 11

Typical Coal Cars

Type	Capacity	
	Tons	Cubic Feet
Hopper, two pocket	60	2,543
Hopper, three pocket	70	2,733-2,750
Hopper, three pocket	80	2,713-2,962
Hopper, three or more pockets	100	3,301-3,600

SOURCE: Louisville & Nashville and Clinchfield Railroads Coal Mine Directory & Coal Transportation Guide, 1981, p. 43.

TABLE 12

Typical Unloading Systems, Unit Trains

Type	Cars	Unloading Capacity (Tons per hour)	Comments
Trestle	automated, self-clearing	14,000	train in motion at 5 mph; unit train locomotives and crew utilized
Under-track pit	automated, self-clearing	3,000 (minimum)	train in motion at 1/3 mph; unit train locomotives and crew utilized
Rotary dumper	rotary, coupler	3,000	plant locomotive or car positioner utilized
Rotary dumper	random sizes (100 ton)	2,000	plant locomotive utilized
Under-track pit	random sizes (100 ton)	2,000	plant locomotive utilized; car shaker

SOURCE: Louisville & Nashville and Clinchfield Railroads Coal Mine Directory & Coal Transportation Guide, 1981, p. 45.

Table 13

Impacts of Transportation Alternatives

Impacts	Barge(1)	Barge(2)	Rail	Pipeline	Truck
Environmental	0	+	0	-	0
Employment	0	0	0	-	+
Urban conflict	0	0	-	0	-
Traffic congestion	0	0	0	0	-
Land use	0	-	-	0	0
Conflict with other modes	0	-	-	0	0
Safety	0	+	-	0	-
Resource use	0	0	+	-	0

Barge(1): Transportation of oil from Boca Grande/other ports
Barge(2): Transportation of coal from Boca Grande/other ports
Rail: Transportation of oil/coal by rail
Pipeline: Transportation of coal by slurry pipeline
Truck: Transportation of coal/oil by truck

0 = existing level
+ = positive impact
- = negative impact

(For a complete discussion of the impacts, the reader is referred to main body of this report.)

TABLE 14

Edison Memorial Bridge Openings[1]

	1981	1982	1983	1984	Average
January	498	435	607	554	524
February	568	484	542	539	559
March	685	587	778	736[2]	697
April	712	573	458	---	581
May	442	544	497	---	495
June	373	559	482	---	472
July	312	471	513	---	432
August	323	456	388	---	389
September	332	344	388	---	355
October	471	531	524	---	509
November	465	637	603	---	569
December	398	554	504	---	486
Total	5,579	6,175	6,284	---	6,013
Average	465	515	524	---	---

[1] The Edison Memorial Bridge (U.S. 41-Business and County Road 739) crosses the Caloosahatchee River at Fort Myers.

[2] Last month available from source.

SOURCE: Florida Department of Transportation, Maintenance Department, Bartow, Florida, personal communication, 7 May, 1984.

TABLE 15

Unit Train Fuel Delivery[1]

Number of Cars	Total Capacity[2]	Frequency[3,4] Per Year	Frequency[3,4] Per Week	Train Length[5]
30	3,000 tons	137	6	1,590 feet
70	7,000 tons	59	3	3,710 feet
100	10,000 tons	41	2	5,300 feet

[1] To supply the estimated 1990 coal demand of 410,000 tons.

[2] At 100 tons per car.

[3] Includes both the south-bound (delivery) trip and the north bound (return) trip.

[4] Any fraction is counted as an additional unit.

[5] At 53 feet per car. Locomotives and other cars not included. Source: Louisville & Nashville and Clinchfield Railroads Coal Mine Directory & Coal Transportation Guide, 1981, p. 44.

TABLE A-1

Engineering Analysis Results

	Boiler Design/Derate	Space Considerations	Size/Year placed in Service	Coal Transportation/ Unloading Facilities	Other Considerations and Cost	Total Engineering Score	Rating
Maximum Points Available	40	15	15	15	15	100	
Anclote	5	5	13	2	7	32	Poor
Bartow	37	11	10	12	12	82	Good
Cape Canaveral	35	7	9	10	8	69	Good
Deerhaven	34	14	7	14	11	80	Good
Fort Myers	35	10	9	10	9	73	Good
Hopkins	10	13	9	10	10	52	Fair
Indian River	5	12	10	10	6	43	Fair
Manatee	30	14	13	10	10	77	Good
Martin	30	14	15	10	8	77	Good
McIntosh	12	10	9	13	4	48	Fair
Northside	8	5	11	10	7	41	Fair
Port Everglades	35	7	9	10	8	69	Good
Sanford	35	9	11	10	10	75	Good
Turkey Point	35	9	9	10	10	73	Good

SOURCE: U.S. Department of Energy, p. 13.

TABLE A-2

Engineering Analysis
Fort Myers Unit 2

Item	Rating	Maximum Points Score
Boiler Design/Derating:		
Limited boiler modifications required	35	40
No derating is anticipated while burning coal		
Space Considerations:		
Adequate space available onsite for coal storage and ash disposal	10	15
Area around boiler is not too congested and coal handling equipment can be installed		
Space for particulate control is available		
Size/Year Placed in Service:		
Boiler 2 - 402 MW; 1969	9	15
Coal Transportation/Unloading Facilities		
Barge delivery of coal is feasible	10	15
Construction of coal unloading and handling systems required		
Other Considerations and Cost:		
Stacks should be rebuilt to handle increased flue gas volume	9	15
Approximate capital cost for coal conversion is $149.2 million ($371/KW)		
	73	100

Fort Myers Unit 2 would require only limited boiler modifications to burn coal. Also, no derating is expected while firing coal. The boiler also has considerable remaining useful life. Adequate space for coal storage and ash disposal is available onsite. Space in the vicinity of the boilers is available for coal handling and firing equipment and also for particulate control equipment. The stacks should be rebuilt because of the increased flue gas volume. Because barge facilities exist for oil transport, this method of delivery is feasible for coal movement to the site.

SOURCE: U.S. Department of Energy, p. 18.

TABLE A-3

Environmental Ranking

Fort Myers	G
Cape Canaveral	G
Deerhaven	G
Hopkins	G
Martin	G
Sanford	G
Anclote	G
Indian River	G
Manatee	G
Bartow	F
McIntosh	F
Northside	F
Port Everglades	F
Turkey Point	F

G = Good
F = Fair
P = Poor

SOURCE: U.S. Department of Energy, p. 47.

TABLE A-4

Site-Specific Environmental Sensitivities

Site	Environmental Sensitivity	Air Quality (SO_2-PSD Class I	Groundwater (Trace Metals)	Surface Water (Trace Metals)	Solid Waste (Suitable Land)
Anclote			x		
Bartow			x	x	
Cape Canaveral			x		
Deerhaven			x[2]		
Fort Myers			x		
Hopkins			x[2]	x	
Indian River			x	x	
Manatee			x		
Martin			x		x
McIntosh			x[2]	x	
Northside		x	x		x
Port Everglades		x	x		x
Sanford			x		x
Turkey Point		x	x		x

[1] All the environmental sensitivities identified for air, water, and solid waste can be ameliorated through the application or appropriate mitigative techniques.

[2] Uncontrolled discharge could result in contamination of groundwater in shallow aquifers at all sites, but only at Deerhaven, Hopkins, and McIntosh could such uncontrolled discharge result in infiltration into deep aquifers.

SOURCE: U.S. Department of Energy, p. 48.

TABLE A-5

Overall Economic Potential

Good:	Deerhaven
	Hopkins
	Manatee
	Northside
Fair:	Bartow
	Cape Canaveral
	Indian River
	McIntosh
	Port Everglades
	Sanford
	Turkey Point
Poor:	Anclote
	Fort Myers
	Martin

SOURCE: U.S. Department of Energy, p. 71.

TABLE A-6

Composite Ranking

	Engineering	Environmental	Economic	Composite
Anclote	P	G	P	F
Bartow	G	F	F	F
Cape Canaveral	G	G	F	G
Deerhaven	G	G	G	G
Fort Myers	G	G	P	F
Hopkins	F	G	G	G
Indian River	F	G	F	F
Manatee	G	G	G	G
Martin	G	G	P	F
McIntosh	F	F	F	F
Northside	F	F	G	F
Port Everglades	G	F	F	F
Sanford	G	G	F	G
Turkey Point	G	F	F	F

G = Good
F = Fair
P = Poor

SOURCE: U.S. Department of Energy, p. 74.

Appendix G
Figures

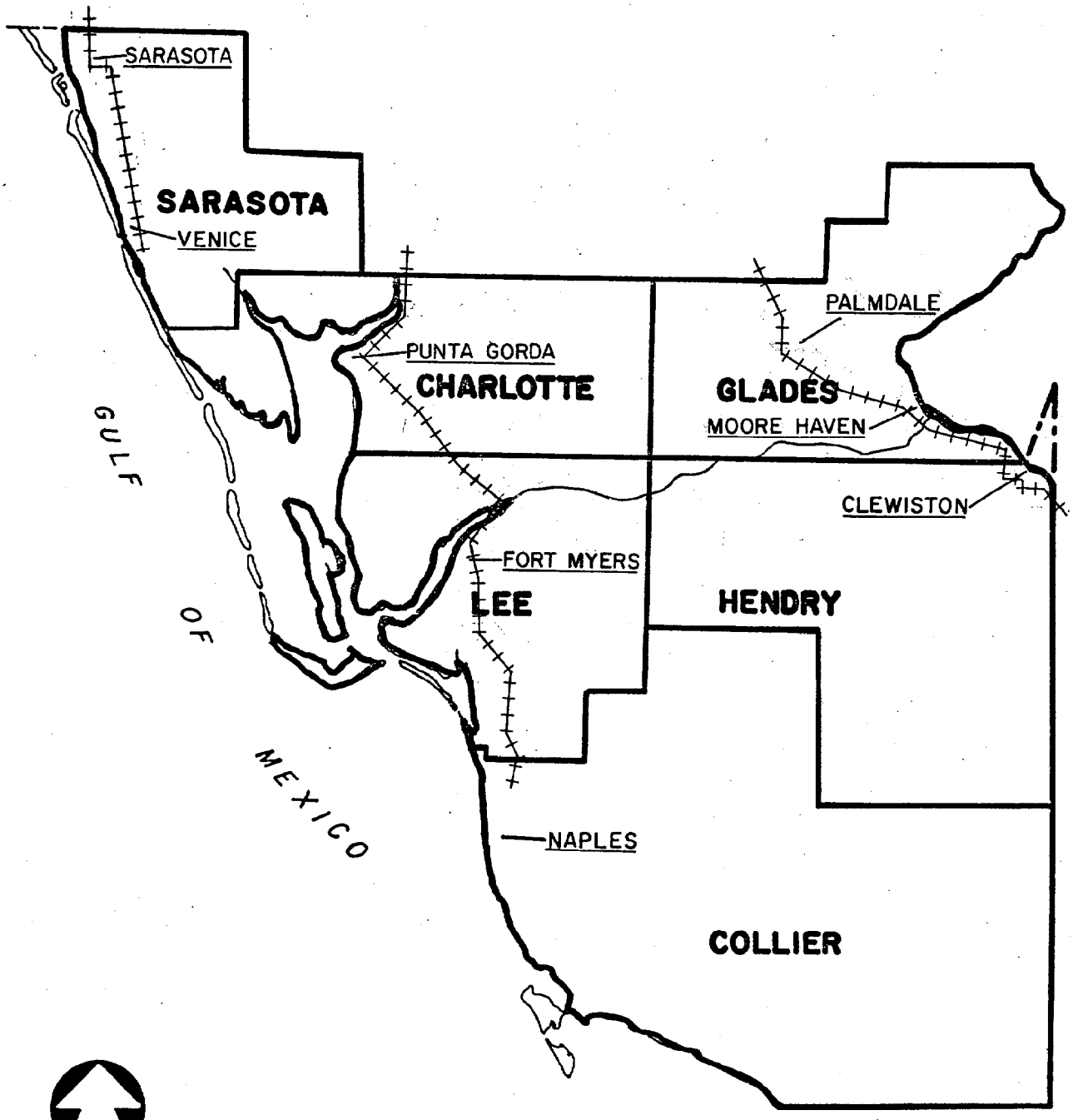


FIGURE 1
SEABOARD COASTLINE RAILROAD

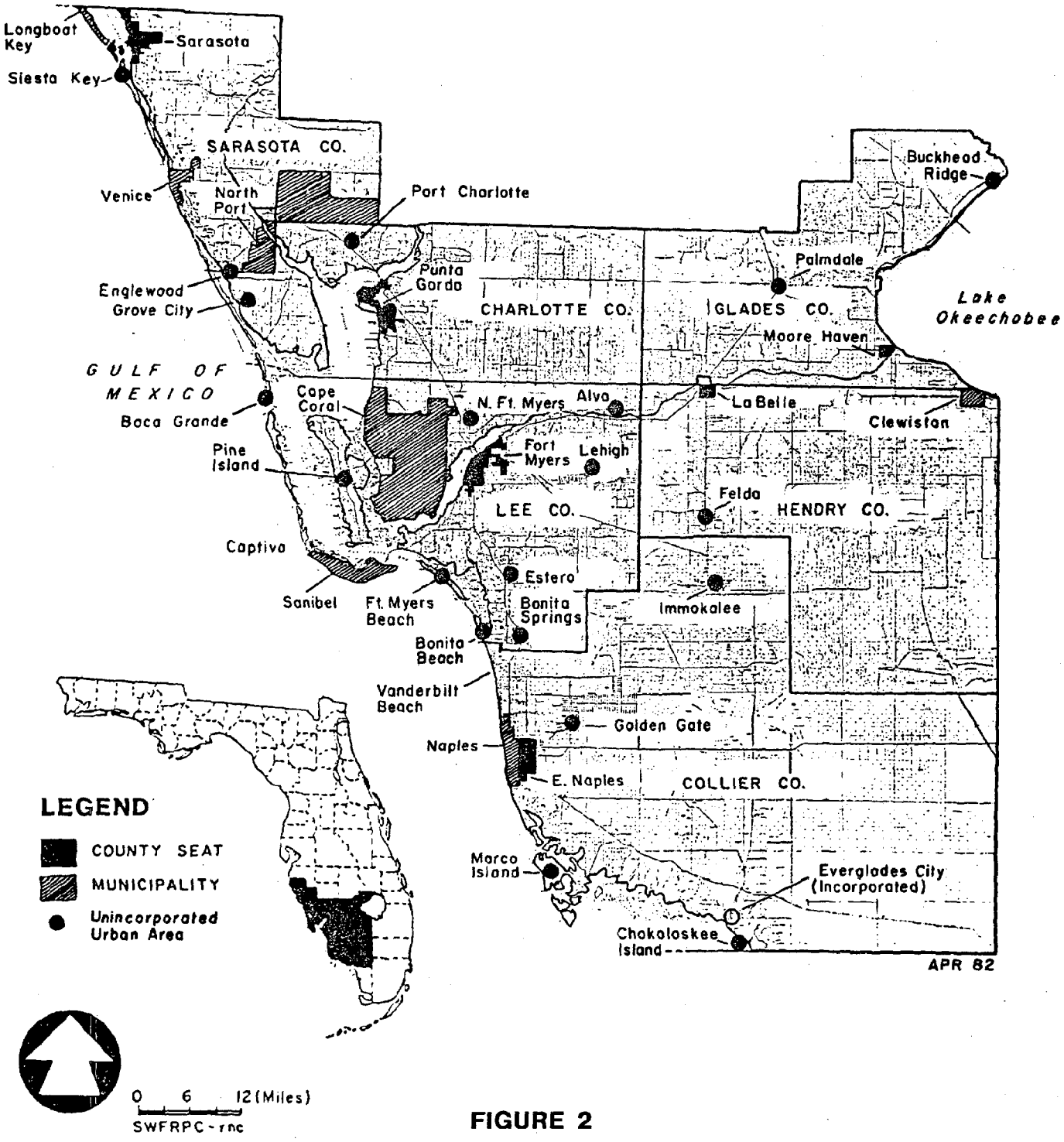


FIGURE 2

SOUTHWEST FLORIDA REGION

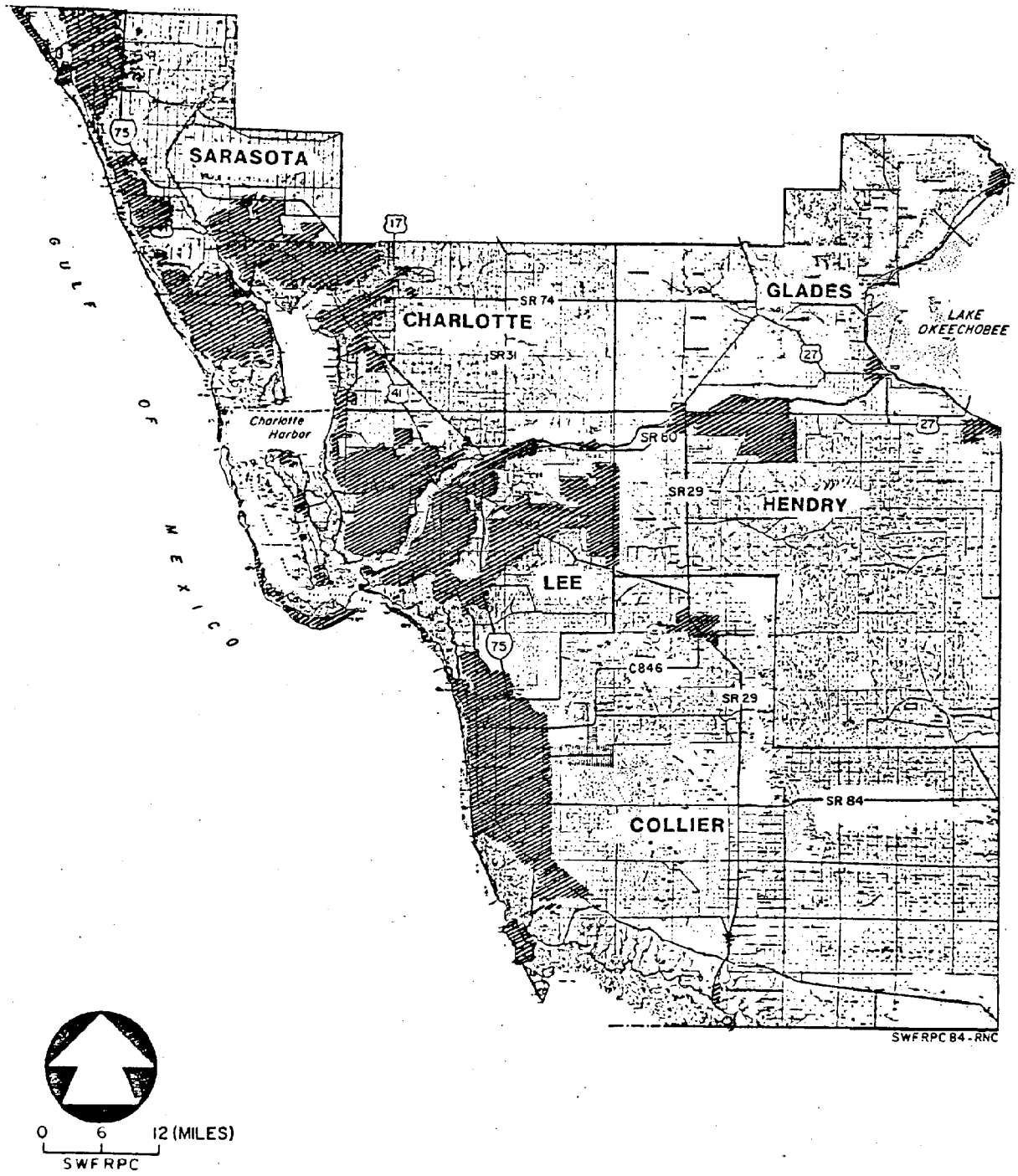


FIGURE 3

FUTURE URBAN AREAS
SOUTHWEST FLORIDA REGION

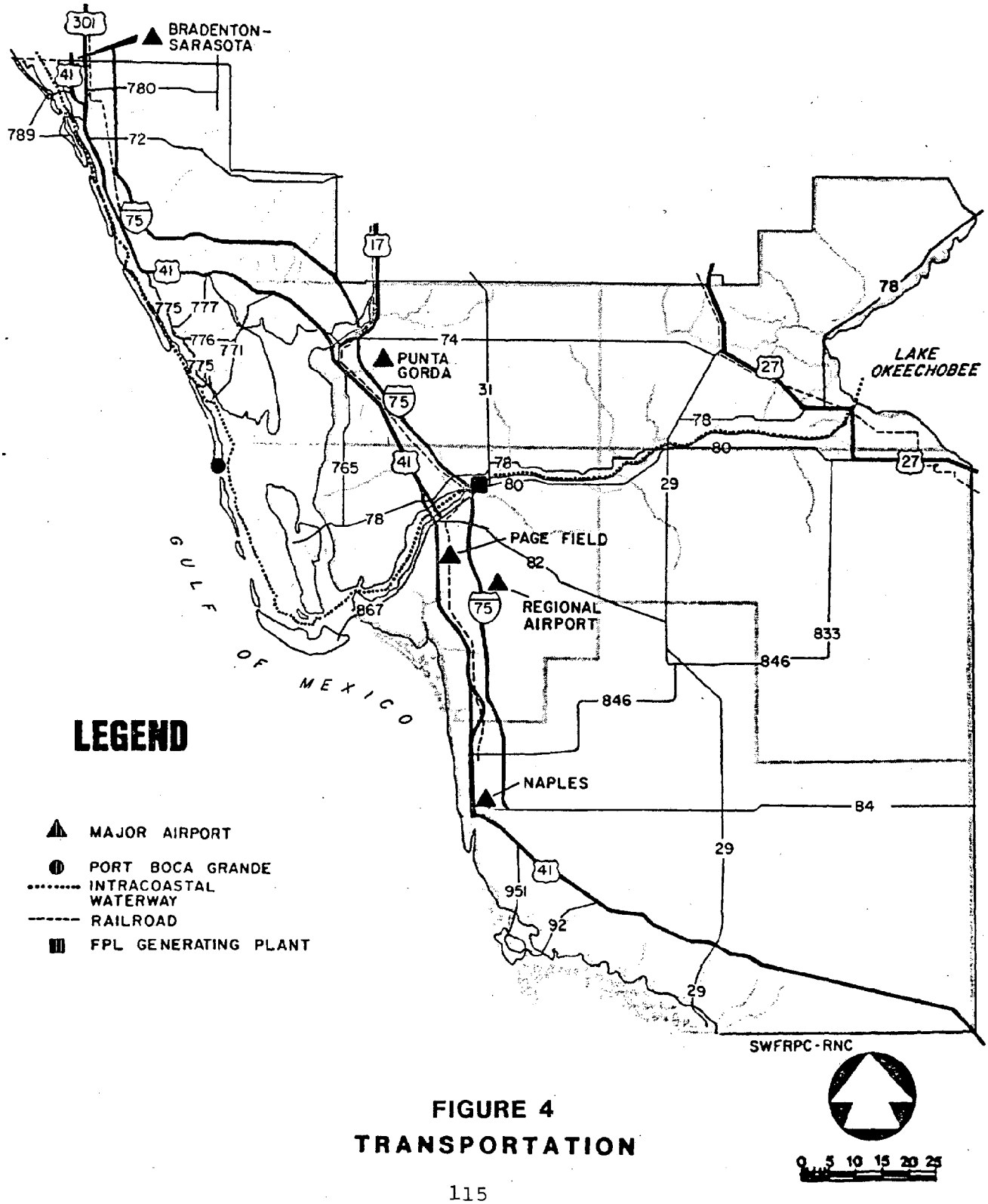


FIGURE 4
TRANSPORTATION

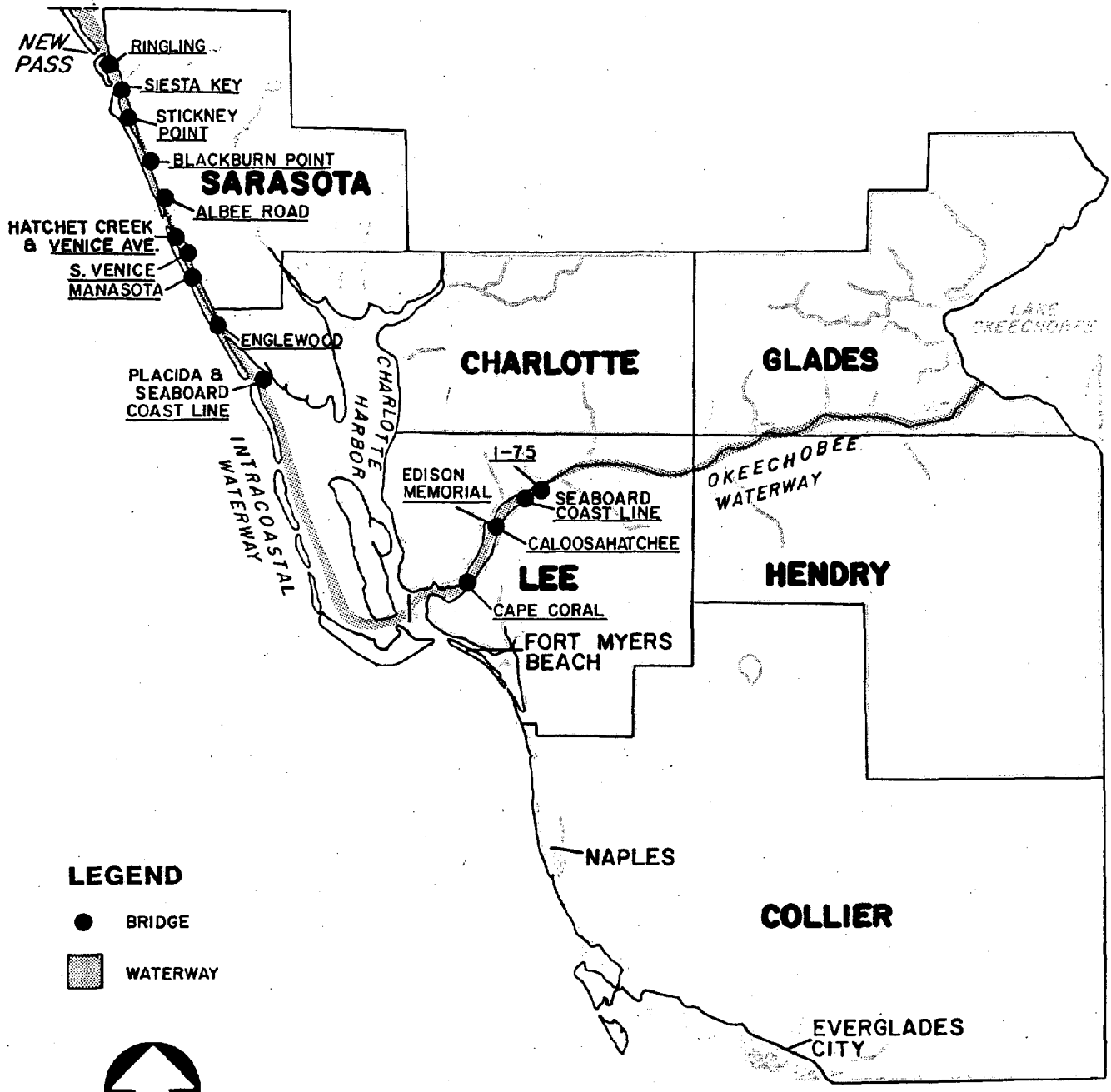
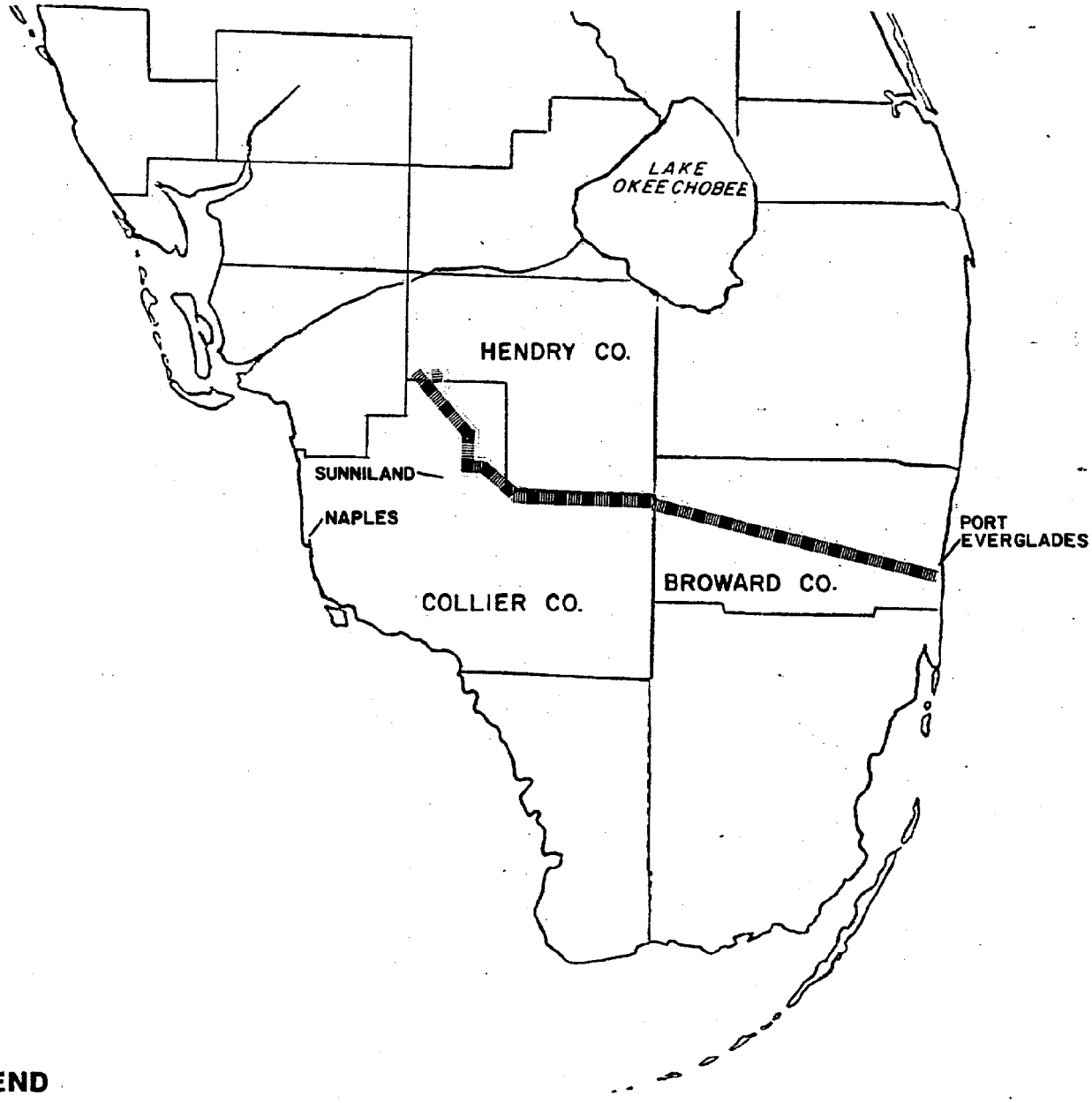


FIGURE 5

WATERWAYS
SOUTHWEST FLORIDA



LEGEND

PIPELINE

FIGURE 6
SUNNILAND PIPELINE

SOURCE: J.J. St. John, Sunniland Pipe Line Company, Inc., 9 June, 1983

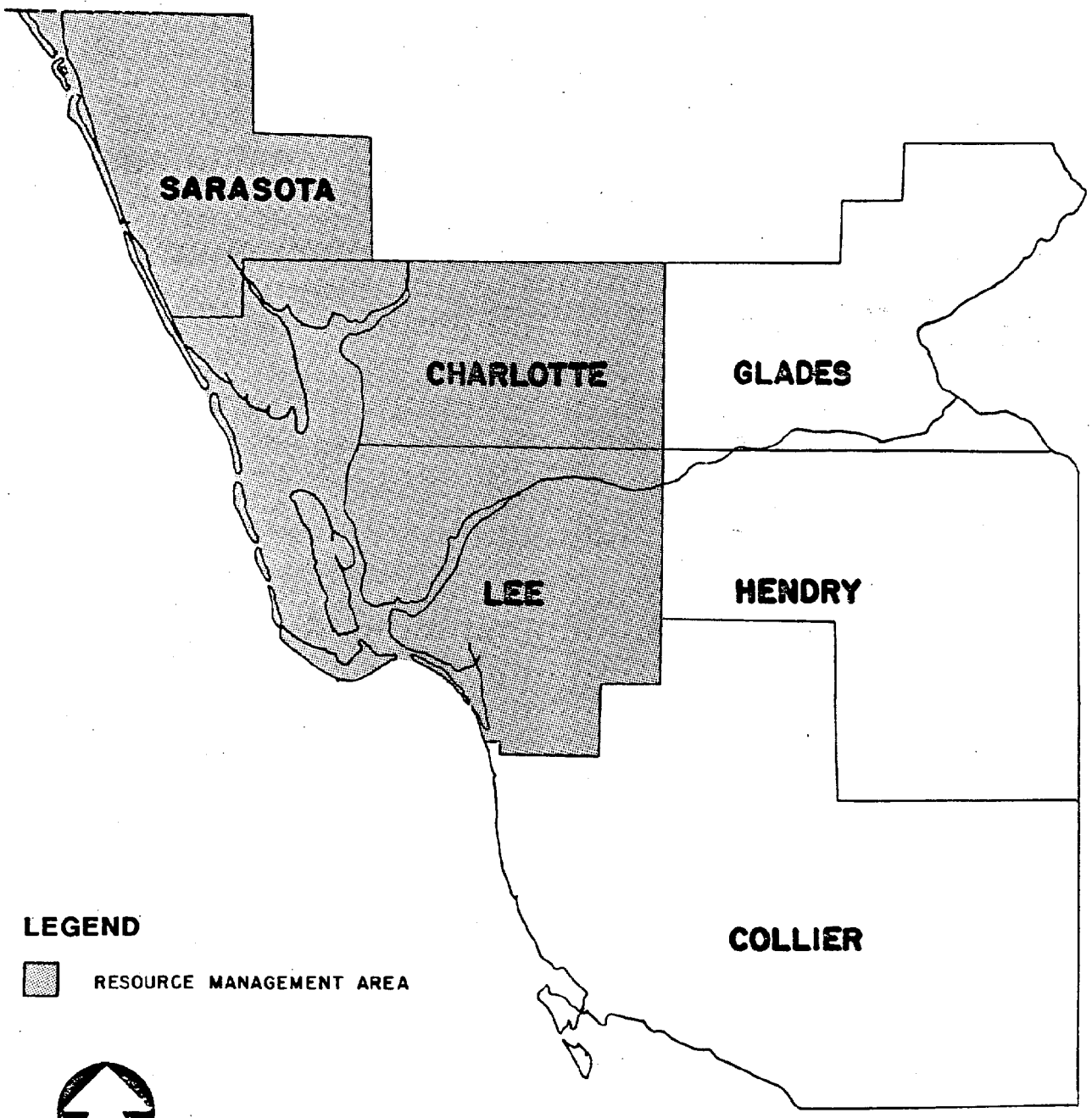


FIGURE 7

CHARLOTTE HARBOR
RESOURCE MANAGEMENT AREA

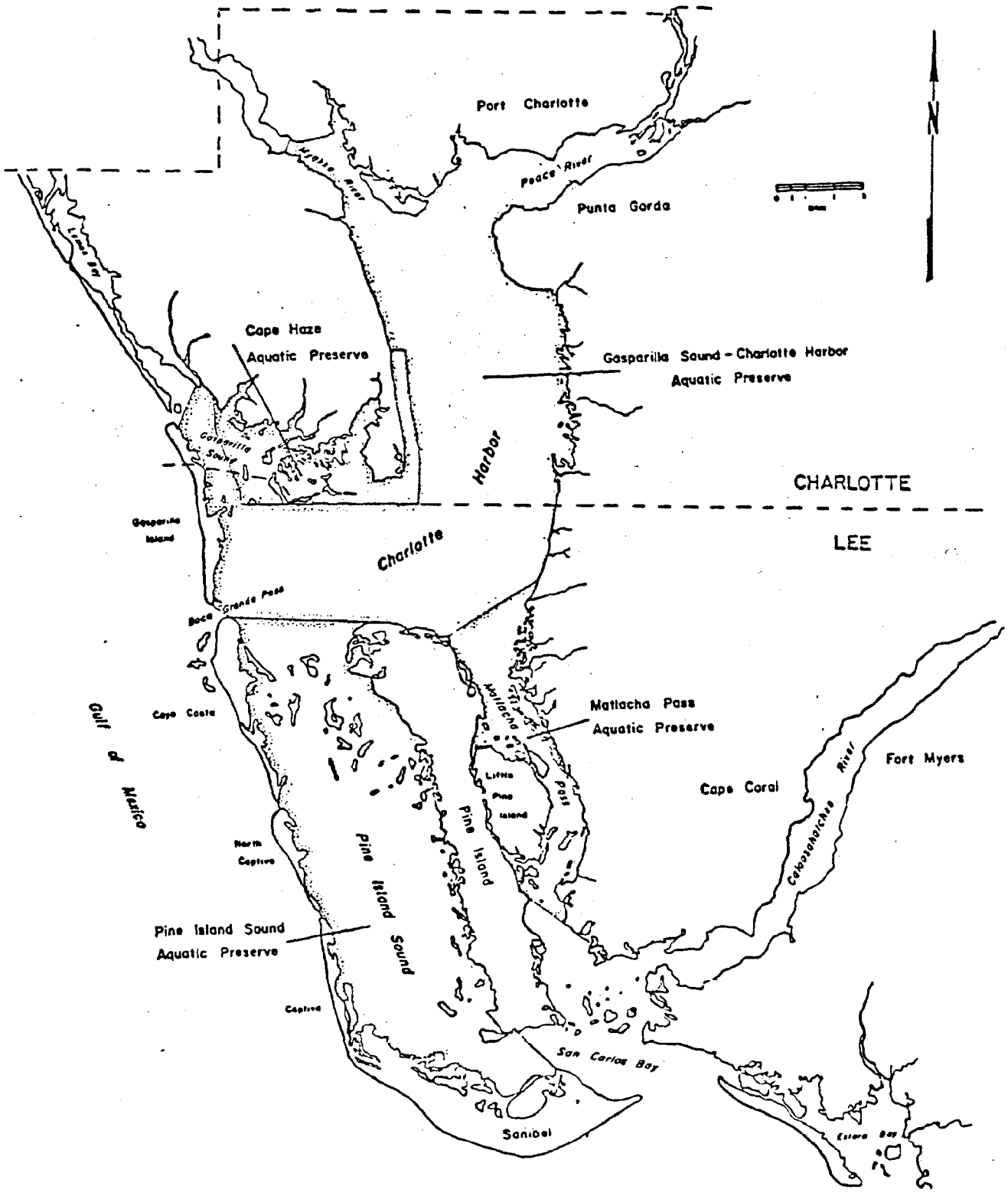


FIGURE 8
CHARLOTTE HARBOR AQUATIC PRESERVES

SOURCE: Florida Department of Natural Resources, Charlotte Harbor Aquatic Preserves Management Plan, 18 May, 1983, p. 2.

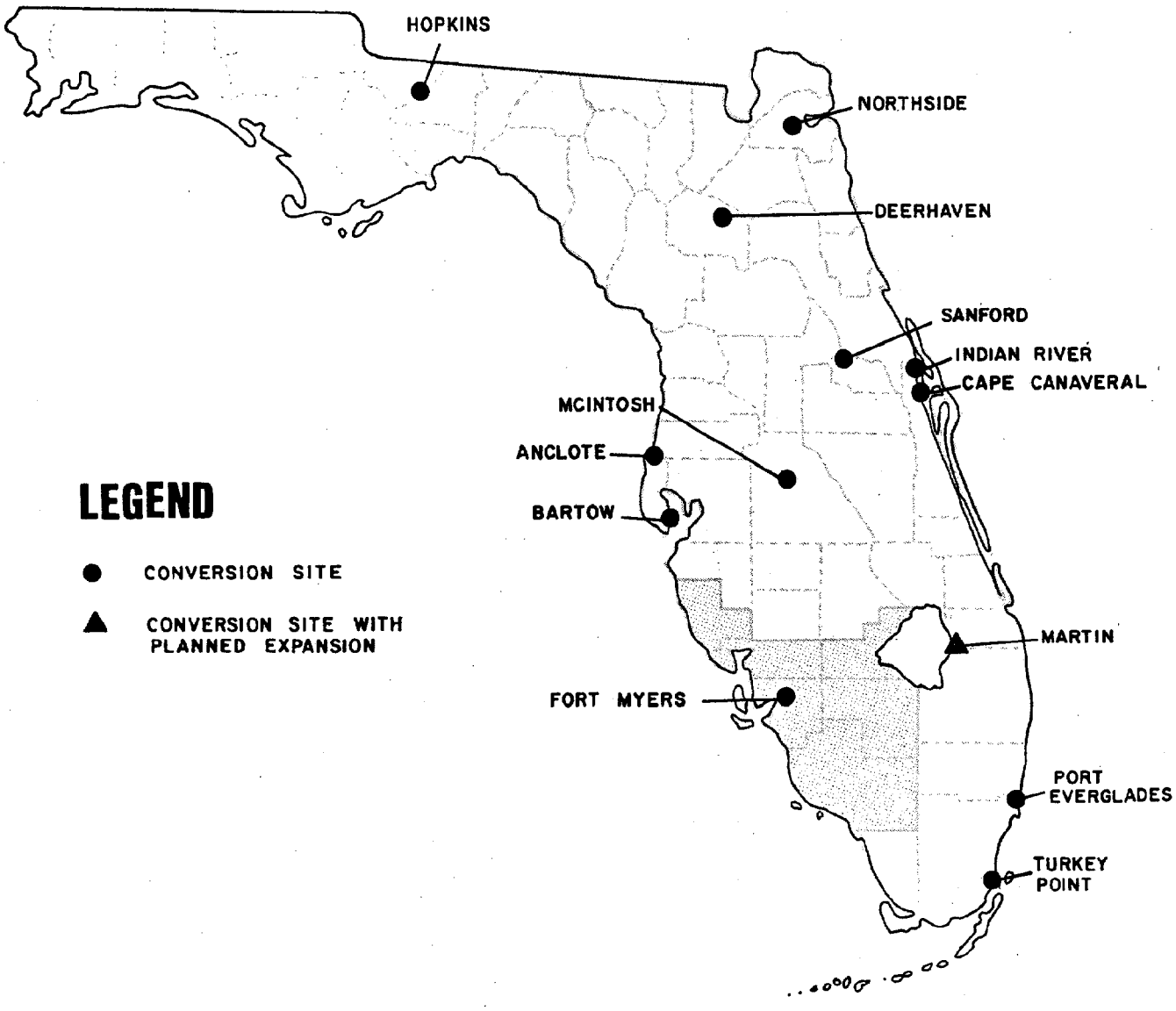


FIGURE A-1
CONVERSION GENERATING STATIONS

SWFRPC